

Vacucenter VC20 / VC50^{ew} User Manual



swiss made

salvisLAB

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User Manual Vacucenter VC20, VC50

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CE DECLARATION OF CONFIRMITY



Declaration of Conformity

Wir
We
Nous

Renggli AG / Salvis-Lab

(Name des Anbieters) (supplier's name) (nom du fournisseur)

Birkenstrasse 31, CH-6343 Rotkreuz

(Anschrift) (address) (adresse)

erklären in alleiniger Verantwortung, dass das Produkt
declare under our sole responsibility that the product
déclarons sous notre seule responsabilité que le produit

Vacuum Drying Oven

VC – 20 / 50

Year of Construction

2002

(Bezeichnung Typ oder Modell, Los-, Chargen- oder Seriennummer, möglichst Herkunft und Stückzahl)
(name, type or model, lot, batch or serial number, possibly sources and numbers of items)
(nom, type ou modèle, no de lot, d'échantillon ou de série, éventuellement sources et nombre d'exemplaires)

auf das sich diese Erklärung bezieht, mit der/den folgenden Norm(en) oder normativen Dokument(en)
übereinstimmt
to which this declaration relates is in conformity with the following standard(s) or other normative
document(s)
auquel se réfère cette déclaration est conforme à la (aux) norme(s) ou autre(s) document(s) normatif(s)

(Titel und/oder Nummer sowie Ausgabedatum der Norm(en) oder der anderen normativen (Dokumente)
(title and/or number and date of issue of the standard(s) or other normative document(s)
(titre et/ou no et date de publication de la (des) norme(s) ou autre(s) document(s) normatif(s)

Gemäss den Bestimmungen der Richtlinie(n): following the provisions of Directive(s); conformément
aux dispositions de(s) Directive(s)
(falls zutreffend) (if applicable) (le cas échéant)

73/23/EWG
EN 60335-1 1988

89/336/EWG
EN 55014

(Ort und Datum der Ausstellung)
(Place and date of issue)
(Lieu et date)

(Name/Unterschrift oder Kennzeichnung des Befugten)
(name and signature or equivalent marking of authorised person)
(nom et signature du signataire autorisé)

Rotkreuz, 12.02.2002

Marcel Käppeli
Technical Manager

Important Information

Quick Information for Service

Please fill out all necessary information for your Vacucenter.
It helps you when you contact your Dealer or Service Department.

SERIAL NUMBER:	
TYPE	<input type="checkbox"/> VC20 <input type="checkbox"/> VC50
VACUUM OPTION	<input type="checkbox"/> None <input type="checkbox"/> Vacuum Display <input type="checkbox"/> Vacuum Control Valve <input type="checkbox"/> Vacuum Control Pump
PHONE NUMBER SERVICE	
PURCHASE DATE	
SOFTWARE VERSION (See Display on Power ON)	

Technical Data's

Technical Data's Vacuum Drying Oven

		VC 20	VC 50
Outer Dimension			
Width	mm	545	645
Height	mm	375	475
Depth	mm	425	525
Installation: Wall distance from the back	mm	50	50
Installation: Wall distance from the side	mm	50	50
Inner Dimension			
Width	mm	250	350
Height	mm	250	350
Depth	mm	320	420
Internal volume	l	20	50
Shelves	standard/max	1/3	1/5
Load per shelf	kg	20	20
Weight (empty)	kg	48	62
Temperature range approx. 5 °C over RT to	°C	200	200
Temperature deviation ¹⁾ at 50°C	± °C	1.0	1.0
Temperature deviation ¹⁾ at 100°C	± °C	1.7	1.9
Temperature deviation ¹⁾ at 150°C	± °C	2.4	2.6
Temperature fluctuation ²⁾ at 150°C	± °C	0.2	0.2
Heating up ³⁾ to 70°C	Min	39	42
to 150°C	Min	58	106
Power supply (±10%) 50/60 Hz	V	230/115	230/115
Nominal wattage	W	900	1200
Heat radiation at 100°C	W	185	205
at 150°C	W	243	286
Equipment			
Microprocessor -Temperature Controller with LCD		Yes	Yes
Timer	Hours / Min	0-999h 59m	0-999h 59m
Printer – Communication Interface RS 232		Yes	Yes
Adjustable Print Interval		Yes	Yes
Programming	Program / Step	50 / 15	50 / 15
Ramp function adjustable in steps of	°C	0.1	0.1

1) Measured with 3 temperature probes on horizontal level / divided in 1/3 of the chamber size

2) maximum temperature deviation in time for one temperature probe

3) to 98% of set temperature

All technical specification are specified for units with standard equipment at an ambient temperature of 25 °C (77 °F) and a Voltage fluctuation of ±10 %. The temperature data are determined in accordance to following DIN 12880, part 2 respecting the recommended wall clearances of 10 % of the height, width and depth of the inner chamber. All indications are average values, typical for units produced in series. We reserve the right to alter technical specifications at all times without prior notice.

Introduction

Overview

The Vacucenter VC20 / VC50 is a vacuum oven with a Microprocessor-controller with enhanced Fuzzy-Logic
- Allows precise ramping of temperature as well as an excellent reproduction of temperature distribution in the chamber.

Special Insulation - Less heat loss. Saves energy and costs. Ambient temperature of housing surface

Robust Swiss quality design – Made even for scientific applications

Work Chambers are of stainless steel and are provided with fully adjustable aluminium shelves

The chambers have well radiused corners for easy cleaning.

Exterior is of textured powder coated mild steel.

Applications

The Vacucenter Line is designed for all purposes of vacuum drying in a variety of laboratory fields.

All Systems have a controller with alphanumeric display and programming capabilities. Temperature ranges up to 200°C.

Construction

Extremely compact construction. Saves valuable space in the lab.

Inner chamber of electro-polished stainless steel Resistant to chemicals and highly durable.

Much more shelf area than other vacuum ovens (for the same inner volume): max. 5 shelves in the VC 50, max. 3 shelves in the VC 20.

Shelves made of 5 mm thick aluminium conduct heat efficiently.

Aluminium shelves are anodised to resist chemicals.

Door seal can easily be removed for cleaning or replacing. The door seal of other vacuum ovens is either glued-in place or screwed-in.

VC 20 only: The shelf supports can easily be removed for ease of cleaning.

All corners are rounded.

The big size glass-window allows a full view of the inner chamber.

The window is made of double glazed safety glass. This is a safety feature: should one pane break, there is still a second one. Tile double-glazing is also an excellent thermal insulator.

All corners are rounded. The door handle is integrated in the door. No hot surfaces. There is no risk of injury or burn.

The door latch is spring loaded. Should there be an over-pressure caused by accidental oxidation inside the chamber, the door will open slightly and allow its release.

Vacuum and Air Systems

Electromagnetic valve controls the vacuum connection at rear. In case of power failure, this valve shuts automatically, the oven is tight and thus remains under vacuum. When the power comes back, the vacuum valve opens automatically and normal operation resumes. The timer continues where it left off.

The inlet of fresh air or inert gas is controlled by a needle valve which allows gentle metering of the incoming air (or gas) and thus prevents turbulence inside the chamber.

A deflector plate at the inlet of the chamber prevents the incoming air from blowing down directly at a powder sample.

Controller

Fuzzy-Logic microprocessor controller with digital alphanumeric LCD-Display, real time clock, variable fan speed and temperature ramp.

Intelligent Fan-Speed control IntelliFan - Wide range of temperature ramping functions. More user application. In combination with Fuzzy-logic gives you an excellent stability of temperature distribution and accuracy of programmed ramp.

Brilliant LCD Display for user-dialog and easy to operate keypad for fast programming and operating.

User dialog with controller is displaying your local language. Up to five languages can be selected.

Easy to operate and programming with EasyMenu

It allows the storage of 50 programs and 15 program steps (a step = a ramp, a temperature, a fan-speed and a dwell time=Hold Time). The programs remain stored in memory even without external power (battery buffered).

Holding Time (dwell time) 0 - 999h 59m

The real time clock allows a process to be started at any time – i.e.: on January 6, 2002 at 5 30 in the morning.

RS-232 interface. All data can be protocol led with a printer or computer. Remote controlling and programming, Door-Switch - switch-off heater/fan by opening door

Safety

DIN 12880 class 3.1 In case of over-temperature, a built in safety controller as a back-up circuit takes over the control of the heating and will shutdown the oven.

There is also an additional mechanical over-temperature device which shuts down the oven

High quality accurate PT 100 temperature sensors.

Superior "Swiss Made" manufacturing quality according ISO9001

Door-Switch - switch-off heater/fan by opening door

Optional threshold pressure Switch (no heating until 300 mbar reached)

Getting Started

Parts delivered

Your System will be delivered with following Parts:

- 1 System Unit
- 1 Shelf
- 1 Power Cord
- 1 User Manual

Install requirements

Ensure that following conditions are met before you install the system.

Electric power connection as per type plate on inside of door must meet your power connector.

The ambient temperature is min. +5° C ... max. 35° C (+40° F ... 95° F)

Installing

Place shelf in appropriate position.

Plug cord

Close door.

Switch power on

Display shows current Firmware Version see Power On Sequence

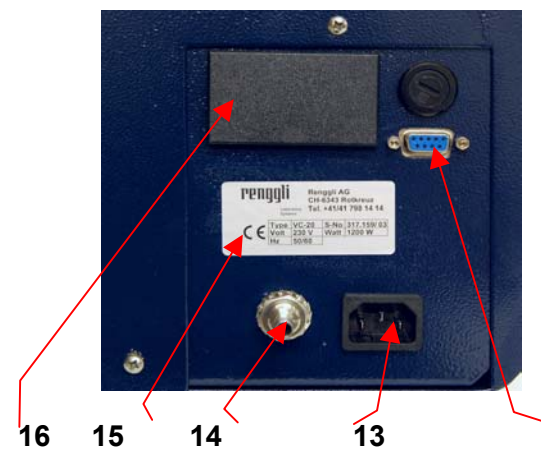
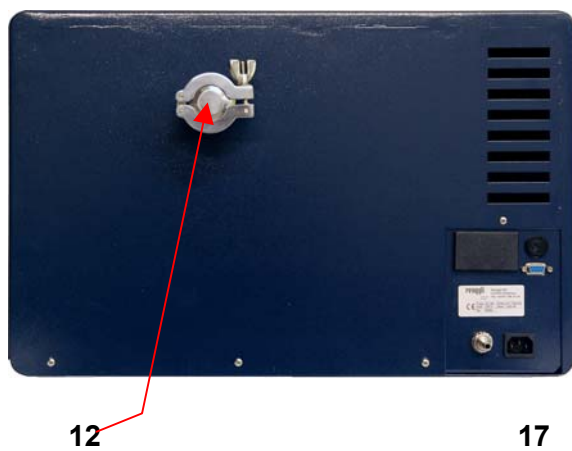
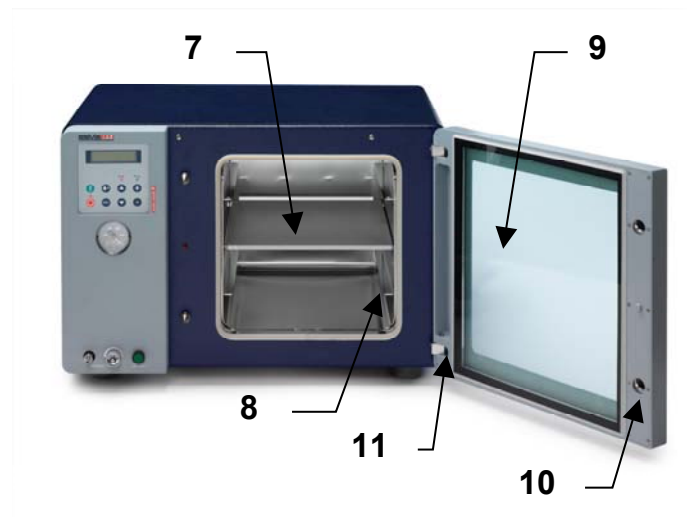
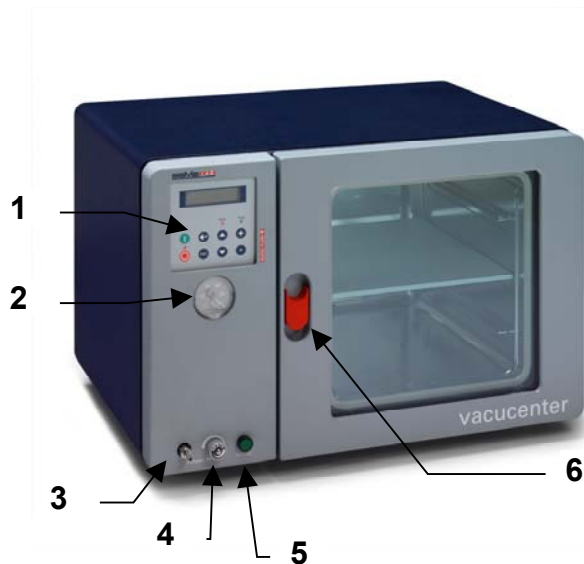
To start oven or program it see Chapter Operating Menus

Cleaning

To clean the System use mild detergents. No Acid or similar detergents should be used.

System Components

- 1 Controller
- 2 Pressure Gauge
- 3 Inert Gas / Air Inlet
- 4 Precision Valve
- 5 Vacuum Switch
- 6 Door Handle
- 7 Shelf
- 8 Shelf Glider
- 9 Double Paned Security Glass
- 10 Spring loaded door lock
- 11 Spring loaded door hinge
- 12 Pass through NW 25
- 13 Serial Interface RS232
- 14 Power connection
- 15 Vacuum connection
- 16 Serial number plate
- 17 Power connection for vacuum pump (only by option vacuum control of internal valve/vacuum pump)



Controller



To control the system the controller has few “easy to use” buttons on a foil keypad. Simply press desired button.
All information is displayed on a Liquid Crystal Display (LCD) with backlit. LED Indicators for status of Power, Heating and Program are used to indicate the main process status.

Buzzer (not visible) is indicating audible Status or Alarm

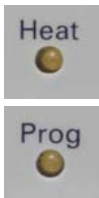
Keypad & Display

Buttons



- | | | |
|-----|--------|---|
| ▲ | Up | You can scroll through the menu structure |
| ▼ | Down | You can scroll through the menu structure |
| ← | Enter | Confirm a menu selection, Confirm a value input or an answer choice |
| ESC | ESC | Escape Cancel actual operation, Go back in Menu Structure, Quit actual state |
| + | Plus | Increase a value in flashing input fields , Select multiple Choices; Input Value must flash to make + button operable |
| - | Minus | Decrease a flashing value, Select multiple Choices; Input Value must flash to make + button operable |
| I | ON/OFF | Switch ON or OFF your System. When on LED is lit |

LED Indicators



When **lit**: Heat Power is on

When **lit**: You are running a program
When **flashing**: A delayed start for program operation was entered.

Operating

How to interpret displays described in this manual...

Power ON Sequence



Salvis Lab
Revision XX.XX

By pressing the power-on button, the display will show the software version. All standard, pre-setted or saved information will be loaded during this process. After a while display will show first Main Menu Point

Input Field



Set Temperature
100.1°C

A input value which is underlayed with yellow(grey) background means this value is flashing on the real display.

Multiple Input Fields



Set Start-Date
DDMMYY 17.08.07

If you reach a multiple input display first time, the first part (... of 3 in this example) of the input field is flashing to indicate input here.. Flashing input fields are changed with +/- keys

Multiple Choice Fields



Display Interval
Yes No

In a multiple choice field the last actual setted (pre-set) option will flash. Change option with + or - and confirm with ↵

Definitions of terms

What is a Set Temperature?

A Set Temperature is the target temperature you want operate the system with.

What is a Gradient?

A Gradient is the slope of the heating up process to the specific set temperature.

It is indicated as °C / Minute. Negative Gradients are not allowed. The maximal value of a gradient is system depending and has a range and is pre-defined by factory. A system specific curve of gradient corridors see

What is a Set Vacuum / Hysteresis Vacuum (only with Vacuum Controller Option)?

Set Vacuum is the target vacuum value. Hysteresis Vacuum is the vacuum-value range to the set value. Within this range the valve or pump is not active. This is a P-control behaviour.

What is a Holding Time?

A timer is used to specify how long a set temperature has to be hold. The timer starts counting back when the set temperature is reached. The maximal time you can set is: 999 hours and 59 minutes. This equals a max time of 41 days 15 hours and 59 minutes

What is a Start Date/Time

If you are using a start date or time you will be able to set a future date/time to start a process or a program.

Main Menu - Overview

General operation buttons

In general you can scroll through the menu points with the ▼ or ▲ button.
Select the desired menu point with ↵

1 Temperature & Options



```
Main Menu
Temp & Options
```

Manual Operation: Define a set temperature and options like gradient, Vacuum values, Hold-time (dwell-time), programmed start date/time.

Press ↵ to select → 1.1

ESC returns to → 1

2 Program



```
Main Menu
Program
```

Programmed Operation: The menu Program is divided in menus for creating, editing, deleting, starting and printing programs.

Press ↵ to select → 2.1

ESC returns to → 1

3 Configuration



```
Main Menu
Configuration
```

This menu point allows you to configure the system

Press ↵ to select → 3.1

ESC returns to → 1

4 Service Mode



```
Main Menu
Service Mode
```

This menu point is protected by an access-code and is available only for trained Service-Technicians.

Press ↵ to select → 4.1

ESC returns to → 1

1 Main Menu - Temp & Options



Manual Operation: Define a set temperature and options like gradient, Vacuum values, Hold-time (dwell-time), programmed start date/time.

Press ←to select → 1.1

ESC returns to → 1

1.1 Set Temperature



+/- change desired value.

←confirms and saves value → 1.2

ESC restores the old value or returns to → 1

1.2 Set Vacuum



Option "Vacuum Control" (Valve or Pump) only !

+/- Change value

←confirms and saves value → 1.3

ESC restores the old value or returns to → 1

1.3 Set Hysteresis of vacuum (P-type control behaviour)



Option "Vacuum Control" (Valve or Pump) only !

+/- Change value

←confirms and saves value → 1.4

ESC restores the old value or returns to 1

1.4 Select Quick Start or Start with Options



+/- Select desired answer

←confirms and saves value

If **Now** selected: System will start immediately → 6

If **Option** selected → 1.5

ESC cancels and returns to → 1

1.5 Set Gradient



+/- Change value

←confirms and saves the value → 1.6

ESC restores the old value or returns to → 1

Note: A value of 0,0 means maximal possible gradient value!

1.6 Set Holding Time (dwell time)



+/- Change value
←confirm value and skips to the next input field (HH → MM) or stores the time and go to → 1.7
ESC restores the old value and skips back one input field (MM→HH) or goes back to → 1
Note: A value of 0:00 means endless holding time

1.7 Set Start-Date



+/- Change desired value
←confirm value and skips to the next input field (DD → MM, MM→YY) or stores the date and go to → 1.8
ESC restores the old value and skips back one input field (YY→MM, MM→ DD) or goes back to → 1
Note: The pre-set date is the actual date from the real-time clock.

1.8 Set Start Time



+/- Change desired value
←confirm value and skips to the next input field (HH → MM) or stores the time and go to :
If the Start Date and/or Start Time is in the **past**, the display will return back to → 1
If your Start Date and/or Start Time is in the **future** you will see the operating display → 5
ESC restores the old value and skips back one input field (MM→HH) or goes back to → 2.1
Note: The pre-set time is the actual time from the real-time clock.

2 Main Menu - Program



```
Main Menu
Program
```

Programmed Operation: The menu Program is divided in menus for creating, editing, deleting , starting and printing programs.

Press ←to select → **2.1**

ESC returns to → **1**

2.1 Menu Program - Start



```
Menu Program
Start
```

Start an existing program

←confirm menu choice→ **2.1.1**

▼/▲ scroll through the Menu.

ESC return to → **2**

2.2 Menu Program - New



```
Menu Program
New
```

Create a new program

←confirm menu choice → **2.2.1**

▼/▲ scroll through the Menu.

ESC return to → **2**

2.3 Menu Program - Edit



```
Menu Program
Edit
```

Edit an existing program

←confirm menu choice → **2.3.1**

▼/▲ scroll through the Menu.

ESC return to → **2**

2.4 Menu Program - Delete



```
Menu Program
Delete
```

Delete an existing program

←to select [Delete Program] → **2.4.1**

▼/▲ scroll through the Menu.

ESC return to → **2**

2.5 Menu Program - Print



```
Menu Program
Print
```

Print a program

←to select [Print Program] → **2.5.1**

▼/▲ to scroll through the Menu.

ESC return to → **2**

2.1 Menu Program - Start



Start an existing program
←confirm menu choice→ 2.1.1
▼/▲ scroll through the sub-menu.
ESC returns to → 2

2.1.1 Select Program



+/- select desired program number
←confirm value → 2.1.2
ESC returns to → 2.1

Note: Only stored only program numbers with content will appear in the display. If no program exist a beep-message will displayed.

2.1.2 Choose type of program start



+/- select type of program start
←accept choice
If **Now** selected: System starts immediately → 6
If **Later** selected : → 2.1.3
ESC returns to → 2.1

2.1.3 Set Start Date



+/- Change desired value
←confirm value and skips to the next input field (DD → MM, MM→YY) or stores the date and go to → 2.1.4
ESC restores the old value and skips back one input field (YY→MM, MM→ DD) or goes back to → 2.1
Note: The pre-set date is the actual date from the real-time clock.

2.1.4 Set Start Time



+/- Change desired value
←confirm value and skips to the next input field (HH → MM) or stores the time and go to :
If the Start Date and/or Start Time is in the **past**, the display will return back to → 2.1.2
If your Start Date and/or Start Time is in the **future** you will see the operating display → 7
ESC restores the old value and skips back one input field (MM→HH) or goes back to → 2.1
Note: The pre-set time is the actual time from the real-time clock.

2.2 Menu Program - New

The storage capacity is 50 Programs with 15 Steps/Program. Each Step contains of a Set-Temperature, a Gradient, a Hold-Time and a Fan-Speed.

The sample here assumes creating a program #4 with 2 Steps.



Create a new program
←confirm menu choice → 2.2.1
▼/▲ scroll through the Menu-Program.
ESC returns to → 2

2.2.1 Create a new program



+/- select desired program number
←confirms the choice → 2.2.2
ESC returns to → 2.2

Note: Only free program numbers will appear in the display.

2.2.2 Set Temperature – Step 1



+/- change desired value. Pre-set value is the last used value in manual mode.
←confirm and saves → 2.2.3
ESC restores the old value or returns to → 2.2 and the step 1 as well as selected program number is not stored !

Note: Display 04/01 means actual program/step number.

2.2.3 Set Vacuum – Step 1



Option “Vacuum Control” (Valve or Pump) only !

+/- Change value
←Accept value → 2.2.4
ESC returns to → 2.2

2.2.4 Set Hysteresis of vacuum – Step 1



Option “Vacuum Control” (Valve or Pump) only !

+/- Change value
←Accept value → 2.2.5
ESC returns to → 2.2

2.2.5 Set Gradient – Step 1



+/- change desired value
←confirms the value → 2.2.6
ESC restores the old value or returns to → 2.2 and the step 1 as well as selected program number is not stored !

Note: A value of 0:0 means maximal gradient

2.2.6 Set holding time (dwell time) – Step 1



Hold Time
04/01 H:M 10:00

+/- Change desired value
←confirm value and skips to the next input field (HH → MM) or stores the time and go to → 2.2.7
ESC restores the old value and skips back one input field (M→H) or goes back to → 2.2 and the step 1 as well as selected program number is not stored !

Note: A value of 0:00 means endless holding time

2.2.7 Choose if a additional step is required



New Step ?
Yes No

+/- Select desired answer
←accept
If **Yes** selected: step number will increment with 1 → 2.2.8
If **No** selected: → 2.2.14

2.2.8 Set Temperature – Step 2



Set Temperature
04/02 100.3°C

+/- change desired value
←confirm the value → 2.2.9
ESC restores the old value or **if in step 2 and higher** returns to → 2.2.7 but the actual step will not be saved !

Note: Display 04/02 means actual program/step number

2.2.9 Set Vacuum – Step 2



Set Vacuum
04/02 120.6mbar

Option “Vacuum Control” (Valve or Pump) only !

+/- Change value
←Accept value → 2.2.10
ESC returns to → 1

2.2.10 Set Hysteresis of vacuum – Step 2



Hyster. Vacuum
04/02 2.5mbar

Option “Vacuum Control” (Valve or Pump) only !

+/- Change value
←Accept value → 2.2.11
ESC returns to → 1

2.2.11 Set Gradient – Step 2



Gradient
04/02 2.0°C/Min

+/- change desired value
←confirm the value → 2.2.12
ESC restores the old value or **if in step 2 and higher** returns to → 2.2.7 but the actual step will not be saved !

2.2.12 Set Holding Time – Step 2



Hold Time
04/02 H:M 1:30

+/- Change desired value
←confirm value and skips to the next input field (HH → MM) or stores the time and go to → 2.2.13
ESC restores the old value and skips back one input field (M→H) or **if in step 2 and higher** returns to → 2.2.7 but the actual step will not be saved !

Note: A value of 0:00 means endless holding time

2.2.13 Choose if a additional step is required



+/- Select desired answer
←accept

If **Yes** selected: step number will increment with 1 → 2.2.7
If **No** selected: → 2.2.14

2.2.14 End of programming sequence



+/- Select desired answer
←accept

If **Yes** selected: → 2.2.15
If **No** selected: → 2.2.13

2.2.15 Confirming & Saving the new program



Displays confirmation that the new program has been stored.
After a few seconds the display will return to → 2.2

2.3 Menu Program- Edit

The example assumes to edit the program #4 with 2 steps



Edit an existing program
←confirm menu choice → 2.3.1
▼/▲ scroll through the Menu.
ESC returns to → 2

2.3.1 Choose program to edit



+/- select desired value
←confirms the value and skips to the next field (P→S) or →
2.3.2 (to the selected Step Number respective)
ESC returns to → 2.3

Note: Only used program and step numbers will appear in the display

2.3.2 Set Temperature – Step 1



+/- change desired value. Pre-set value is the last used value in manual mode.

←confirm and saves → 2.3.3

ESC restores the old value or returns to → 2.3 and the step 1 as well as selected program number is not stored !

Note: Display 04/01 means actual program/step number.

2.3.3 Set Vacuum – Step 1




Option "Vacuum Control" (Valve or Pump) only !

+/- Change value

←Accept value → 2.3.4

ESC returns to → 2.3

2.3.4 Set Hysteresis of vacuum – Step 1



Hyster. Vacuum
04/01 2.5 mbar

Option "Vacuum Control" (Valve or Pump) only !

+/- Change value
←Accept value → 2.3.5
ESC returns to → 2.3

2.3.5 Set Gradient – Step 1



Gradient
04/01 1.5 C/Min

+/- change desired value
←confirms the value → 2.3.6
ESC restores the old value or returns to → 2.3 and the step 1 as well as selected program number is not stored !
Note: A value of 0:0 means maximal gradient

2.3.6 Set holding time (dwell time) – Step 1



Hold Time
04/01 H:M 12:00

+/- Change desired value
←confirm value and skips to the next input field (HH → MM) or stores the time and go to → 2.3.7
ESC restores the old value and skips back one input field (M→H) or goes back to → 2.3 and the step 1 as well as selected program number is not stored !
Note: A value of 0:00 means endless holding time

2.3.7 Set Temperature – Step 2



+/- change desired value
←confirm the value → 2.3.8
ESC restores the old value or **if in step 2 and higher** returns to → 2.3 but changes to the actual step will not be saved !

Note: Display 04/02 means actual program/step number

2.3.8 Set Vacuum – Step 2



Option “Vacuum Control” (Valve or Pump) only !

+/- Change value
←Accept value → 2.3.9
ESC restores the old value or **if in step 2 and higher** returns to → 2.3 but changes to the actual step will not be saved !

2.3.9 Set Hysteresis of vacuum – Step 2



Option “Vacuum Control” (Valve or Pump) only !

+/- Change value
←Accept value → 2.3.10
ESC restores the old value or **if in step 2 and higher** returns to → 2.3 but changes to the actual step will not be saved !

2.3.10 Set Gradient – Step 2



+/- change desired value
←confirm the value → 2.3.11
ESC restores the old value or **if in step 2 and higher** returns to → 2.3 but changes to the actual step will not be saved !

2.3.11 Set Holding Time – Step 2



+/- Change desired value
←confirm value and skips to the next input field (HH → MM) or stores the time and go to → 2.3.12
ESC restores the old value and skips back one input field (M→H) or **if in step 2 and higher** returns to → 2.3 but changes to the actual step will not be saved !
Note: A value of 0:00 means endless holding time

2.3.12 Choose if a additional step is required



+/- Select desired answer
←accept
If **Yes** selected: step number will increment with 1 → 2.3.7
If **No** selected: → 2.3.13

2.3.13 End of programming sequence



+/- Select desired answer
←accept
If **Yes** selected: → 2.3.14
If **No** selected: → 2.3.12

2.3.14 Confirming & Saving the new program



Displays confirmation that the new program has been stored.
After a few seconds the display will return to → 2.3

2.4 Menu Program - Delete

```
Menu Program
Delete
```

Delete an existing program
←select menu → 2.4.1
▼/▲ scroll through the menu.
ESC returns to → 2.4

2.4.1 Choose program # to be deleted

```
Program Nr ?
P04
```

+/- select desired program number
←accept → 2.3.2
ESC returns to → 2.4

Note: Only used program numbers will appear in the display

2.4.2 Deletion confirmation will be displayed

```
Delete Program
Yes No
```

+/- Select desired answer
←accept
If **Yes** selected: → 2.4.3
If **No** selected: → 2.4

2.4.3 Deletion confirmation will be displayed

```
Program P04
Deleted...
```

Display confirms that the selected program has been deleted.
After a few seconds it will go to → 2.4

If you delete a program means you delete all steps associated to this program number. After deleting, the number is now available in the list of free program numbers.

2.5 Menu Program - Print

```
Menu Program
Print
```

Print a program
←to select [Print Program] → 2.5.1
▼/▲ to scroll through the Menu.
ESC return to → 2

2.5.1 Choose program # to be printed

```
Program Nr ?
P04
```

+/- select desired program number
←accept → 2.5.2
ESC return to → 2

Note: Only used program numbers will appear in the display

2.5.2 Displaying print in progress

```
Program P04
Printing...
```

Display confirms that the program has been printed. After a few seconds it will return to → 2.5

For an example of printout and printer connection refer section Printer Operation

3 Main Menu - Configuration

Configuration of the system by the user



In this menu point you can define and set system options
Press ←to select → **3.1**
▼/▲ scroll through the menu.

3.1 Select language



+/- Select the desired language
←confirm selection → **3.2**

Attention:

After confirmation the selection all subsequent dialogs are displayed in the selected language.

3.2 Set actual date for internal real-time clock



+/- change value
←accept value and skips to the next input field ((DD → MM, MM→YY) or saves the date and goes to → **3.3**
ESC restores the old value and/or skips back one input-field (YY→MM, MM→DD)

3.3 Set actual time for internal real-time clock



+/- change value
←accept value and skips to the next input field ((HH → MM) or saves the time and goes to → **3.4**
ESC restores the old value and/or skips back one input-field (MM→HH)

3.4 Set allowed max Temperature



Set the maximal possible temperature value for manual operation.
+/- change value
←accept value → **3.5**
ESC restores value

3.5 Set Threshold value



Option "Vacuum Control" (Valve or Pump) only !

Set the Threshold value between 1 – 1100 mbar
Heating will only start when this value has been reached.
For heating without this safety feature, enter a value of 1100.0 mbar
+/- change value
←accept value → **3.6**
ESC restores value

3.6 Set waiting time for Threshold value



Option "Vacuum Control" (Valve or Pump) only !

Set the waiting time for the Threshold value between 1 Min and 1Hour 59 Min. Should the Threshold value (3.5) not been reached within the programmed time, the process will not start and the message "no vacuum" appears in the display.

+/- change value

←accept value → 3.7 ESC restores value

3.7 Set print interval for printer log via serial RS232 Interface



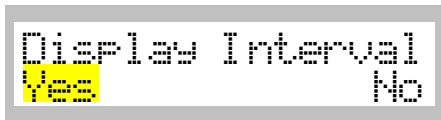
Set the Print Interval time. A value of 00:00 will disable printout of operating values.

+/- change value

←accept value and skips to the next input field ((HH → MM) or saves the time and goes to → 3.8

ESC restores the old value and/or skips back one input-field (MM→HH)

3.8 Set automatic interval to scroll status displays



Select if operation displays will switch automatically instead of manually switching by ▼/▲ keys

+/- toggle answer

←accept → 3.9

3.9 Select Baud Rate for serial RS232 Interface



Available Baud Rate are 1200/2400/4800/9600.

+/- select value

←accept → 3.10

3.10 Set Program End Buzzer



Buzzer sends a signal if a program has finished signal.

+/- toggle option

←accept → 3.11

3.11 Set Safety Alarm-Buzzer



In any case of an over temperature alarm situation, the Buzzer will give an audio signal.

+/- toggle option

←accept → 3.12

3.12 Set LCD Display contrast

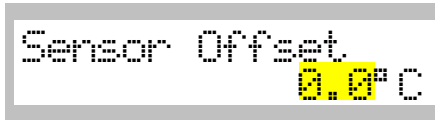


+/- change value

←accept → 3.13

ESC restores value

3.13 Set Offset between internal PT100 Sensor and actual display



Offsets the internal PT100 sensor with the actual displayed temperature. Calibrate with an external temperature sensor.
+/- change value
←accept → **3.14**
ESC restores value

3.14 Set Offset between internal pressure sensor and actual display (Option)



Option "Vacuum Display or "Vacuum Control" (Valve or Pump) only !
Offsets the pressure sensor with the actual displayed vacuum. Calibrate with an external pressure sensor.
+/- change value
←accept → **3.15**
ESC restores value

3.15 Confirmation display of storing entered values



The Display confirms that the Configuration has been Stored. After a few seconds it will return to → **3**

4 Menu Service Mode



This menu point is protected by a code and is only available for trained Service-Technicians.

Status Displays

General

Change the display with ▼/▲ keys or set Display Interval to yes in Menu Configuration to let change the display automatically.

The values shown here have only an example character.

The display will differ according the installed option

① Without Options	② Option: Vacuum Display only	③ Option: Vacuum Controller
-------------------	-------------------------------	-----------------------------

5 Status Display: Manual Mode – Defined Start-Date

If the programmed start-date/time has achieved the systems starts. The display switches to → 6

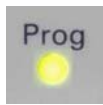
	①	②	③	
Start Date 31.12.07 23:59	✓	✓	✓	Display: Start Date and Time. Press ▼ to get next set of operating-display.
Set Temp 100.9°C Gradient 1.9°C/M	✓	✓	✓	Display: Set Temperature and Gradient. Press ▼ to get next set of operating-display.
SVac 20.0mbar HVac 2.0mbar			✓	Display: Set Vacuum (SVac) and Hysteresis Vacuum (HVac). Press ▼ to get next set of operating-display.
Hold Time 10:59	✓	✓	✓	Display: Hold Time (Dwell Time). Press ▼ to get next set of operating-display.

6 Status Display: Manual Mode – Process Running

	①	②	③	
Set Temp 100.0°C Act Temp 100.0°C	✓	✓	✓	Display: Set Temperature and Actual Temperature. Press ▼ to get next set of operating-display.
Gradient 1.9°C/M	✓			Display: Actual Gradient Press ▼ to get next set of operating-display.
Gradient 1.0°C/M AVac 20.9mbar		✓		Display: Actual Gradient and actual Vacuum value (AVac). Press ▼ to get next set of operating-display.
Gradient 1.9°C/M HVac 2.0mbar			✓	Display: Actual Gradient and actual Hysteresis of vacuum (HVac). Press ▼ to get next set of operating-display.
SVac 20.0mbar Vac 20.2mbar			✓	Display: Set Vacuum value (SVac) and Actual Vacuum value (AVac). Press ▼ to get next set of operating-display.
Hold Time 1:59 31.12.07 23:59	✓	✓	✓	Display: Hold Time (Dwell Time) and actual Date/Time of the real-time clock Press ▼ to get next set of operating-display.

7 Status Display: Program mode - Defined Program Start Date

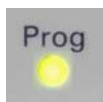
If the programmed Start Date/Time has achieved the system is running the selected program and the display switches to → 8



The indicator-LED „Prog“ is flashing as long as the defined start-date/time has not reached.

	1	2	3	
<pre>Start Date P14 09.09.07 13:10</pre>	✓	✓	✓	Display: Actual program number as well it's Start Date. ESC cancels the "wait for start" state → 9

8 Status Display: Program mode - Program Running



The indicator-LED „Prog“ is on during a programmed operation

	1	2	3	
<pre>Set Temp 100.9° C Act Temp 100.9° C</pre>	✓	✓	✓	Display: Set Temperature and Actual Temperature. Press ▼ to get next set of operating-display.
<pre>Gradient 1.9° C/M</pre>	✓			Display: Actual Gradient Press ▼ to get next set of operating-display.
<pre>Gradient 1.9° C/M AVac 20.0mbar</pre>		✓		Display: Actual Gradient and actual Vacuum value (AVac). Press ▼ to get next set of operating-display.
<pre>Gradient 1.9° C/M HVac 2.0mbar</pre>			✓	Display: Actual Gradient and actual Hysteresis of vacuum (HVac). Press ▼ to get next set of operating-display.
<pre>SVac 20.0mbar AVac 20.2mbar</pre>			✓	Display: Set Vacuum value (SVac) and Actual Vacuum value (AVac). Press ▼ to get next set of operating-display.
<pre>Hold Time 10:59 31.12.03 23:59</pre>	✓	✓	✓	Display: Hold Time (Dwell Time) and actual Date/Time of the real-time clock Press ▼ to get next set of operating-display.
<pre>Program 04 Step 01</pre>	✓	✓	✓	Display: Program Number and Program Step of the actual running program. Press ▼ to get next set of operating-display.

If the program has ended a beep tone (5x) will sound and following display will shown:

```
Message:
Program finished
```

Message can be confirmed by pressing the ←key.

9 Cancel a running process by ESC Key

A running system is stopped by pressing ESC.

9.1 Safety question when stopping a running system



+/- Select desired answer

←accept

If **Yes** selected: → 9.2

If **No** selected: → **Back to running status**

9.2 Conformation of cancelling a process

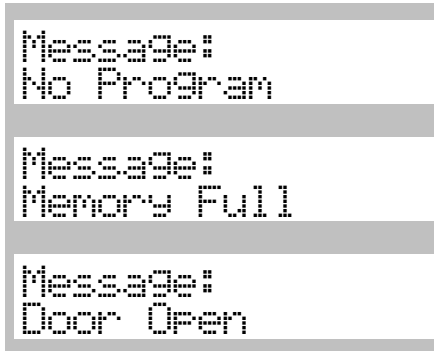


Display confirms that the running process has been cancelled.
After a few seconds it will return to Main Menu → 1

10 Messages and Errors

The messages and Errors are announced with a beep tone (5x) and can be confirmed by pressing the ←Key.

Messages



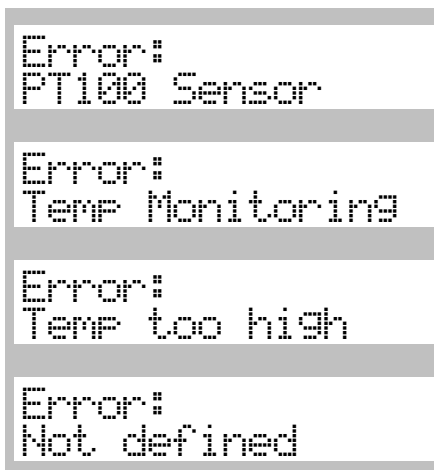
Indicates that no program is in memory

Indicates that the program memory is full

Indicates that the door is open (start or running program)

Errors

Errors are severe system failures and must be fixed by trained service people.



PT100 Sensor or cable defect.
Call Service!

Safety Controller was active.
Call Service!

Temperature exceeded security range level.
Cool down oven.
If error persists call Service!

Call Service!

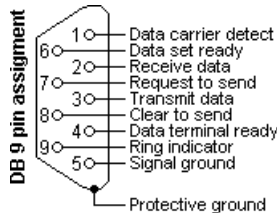
Printer Operation

Connecting a Printer

Printer Requirements

In order to connect a printer with the serial RS232 Interface of the System following requirements must be fulfilled : Serial RS232 Interface, Min. 1200 Baud Transfer Rate.

Pin Layout RS232 DB9 Connector System



Used Pins: 2:TxD , 3:RxD and 5:Signal Ground
Data format: 8 Data Bits, 1 Stop Bit, No Parity
No specific protocol

Examples of different printer outputs

1 Without Options	2 Option: Vacuum Display only	3 Option: Vacuum Controller
-------------------	-------------------------------	-----------------------------

Printout of a stored program

To print the content of stored programs go to Menu “Print Program“ → 2.5)
The printout depends on the installed vacuum options.

Printout of a program in memory

		1	2	3
Program Nr.:	1	✓	✓	✓
Step.:	1	✓	✓	✓
Set Temperature:	20.0 °C	✓	✓	✓
Gradient:	0.2 °C /Min	✓	✓	✓
Set Vacuum:	5.5mbar			✓
Hysteresis Vacuum:	2.5mbar			✓
Hold time:	1:00HHH:MM	✓	✓	✓

Printouts during a run

In order to get printer output for logging active you must set the print interval (see “Print Interval” → 3.5) to a value greater than 0:00, otherwise it is disabled.

Manual Operation

		1	2	3
Date:	25.09.02	✓	✓	✓
Time:	07:29	✓	✓	✓
Set Temperature:	20.0 °C	✓	✓	✓
Act Temperature:	20.4 °C	✓	✓	✓
Gradient:	0.2 °C /Min	✓	✓	✓
Set Vacuum:	5.5 mbar			✓
Act Vacuum:	5.4 mbar		✓	✓
Hysteresis Vacuum:	2.5 mbar			✓
Hold time:	1:00HHH:MM	✓	✓	✓

Programmed Operation

		1	2	3
Date:	25.09.02	✓	✓	✓
Time:	07:29	✓	✓	✓
Program:	48	✓	✓	✓
Step:	2	✓	✓	✓
Set Temperature:	20.0 °C	✓	✓	✓
Act Temperature:	20.4 °C	✓	✓	✓
Gradient:	0.2 °C /Min	✓	✓	✓
Set Vacuum:	5.5 mbar			✓
Act Vacuum:	5.4 mbar		✓	✓
Hysteresis Vacuum:	2.5mbar			✓
Hold time:	1:00HHH:MM	✓	✓	✓

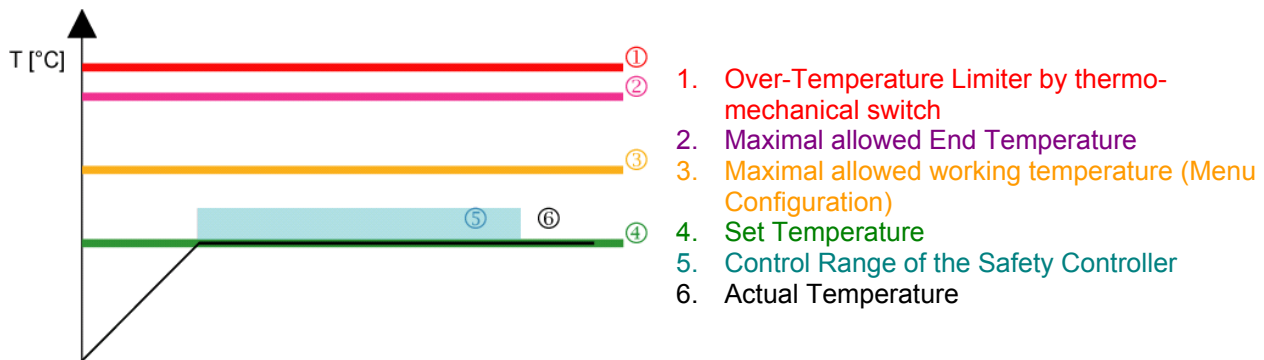
Appendix A

Hysteresis Value for the Vacuum-Control

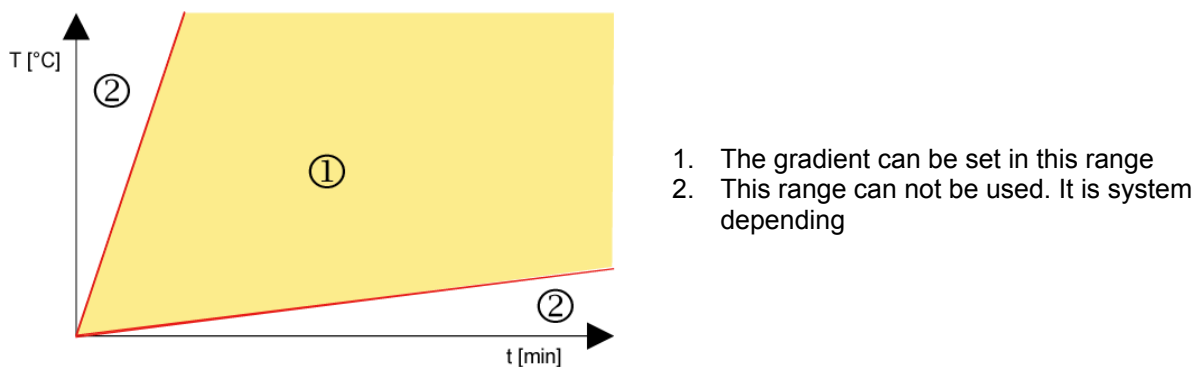
The Hysteresis value of vacuum allows to influence the behaviour of the vacuum controlling. The process of drying under vacuum is influenced by the vapour pressure of the fluids in the drying good. The higher the vapour pressure the lower the vacuum. In extreme case the vacuum pump will run or the vacuum valve is open all the time because of reducing vacuum by the vapour. This behaviour can be controlled by system but the pump or the valve is all the time switching on and off. To reduce this effect you can set a hysteresis value depending on the set vacuum value. This allows the controller a range of acting (hysteresis). This gives a more precise and well controlled drying process

Graphs of temperature limits and gradient and Program-Run

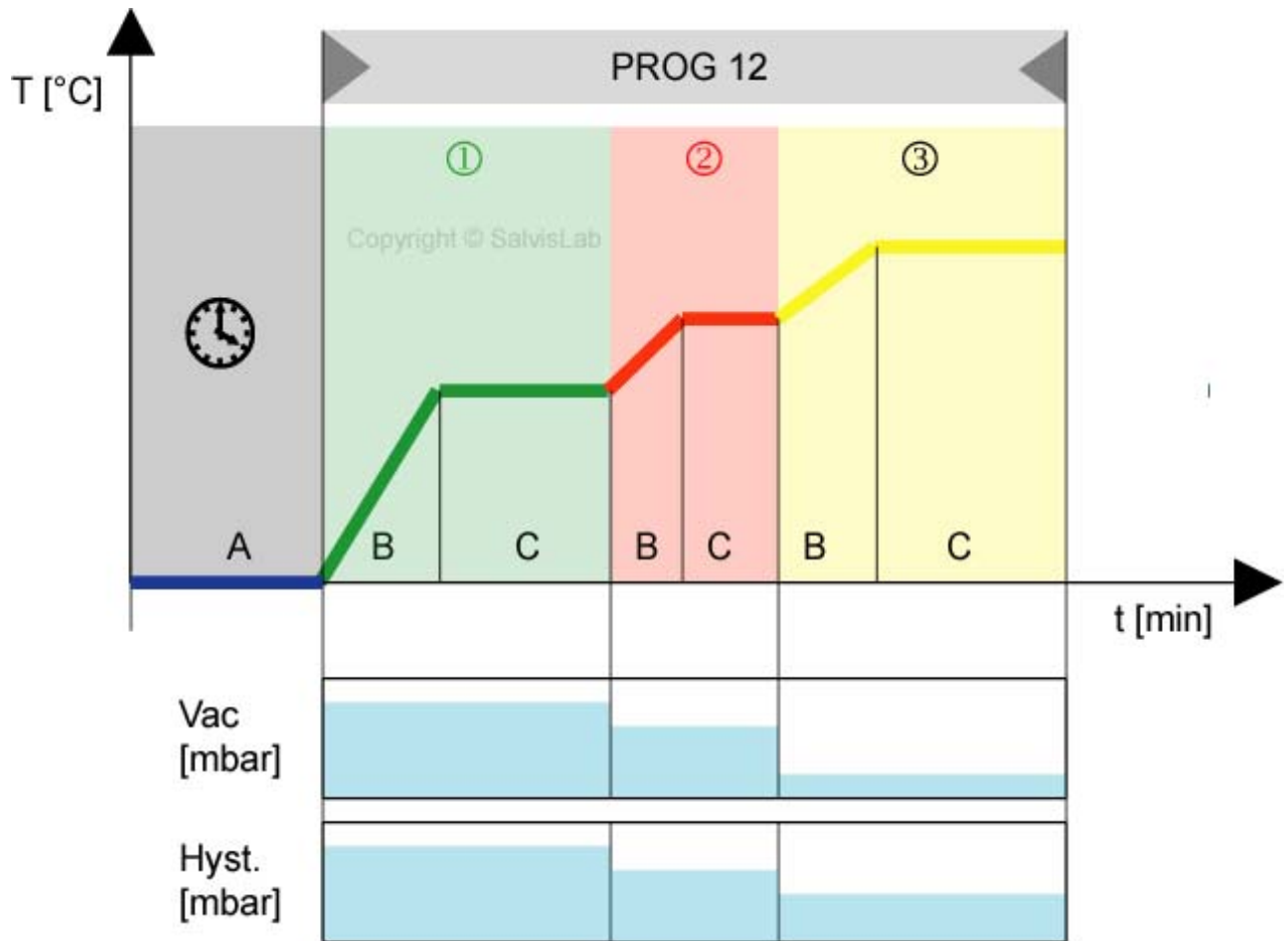
Temperature Limiter & Safety Controlling (Safety Bond)



Range of gradient



Graphical presentation of a program-run



This example shows a program No. 12 with 3 steps and a pre-set start date/time.

- A Timeframe of the pre-set start date/time
- B Positive Gradient (adjustable)
- C Hold-Time, Dwell-Time (Adjustable)

Each of the following 3 steps has the parameter: Set-temperature, gradient, hold-time, set-vacuum, hysteresis vacuum

- 1 Step 1 : Start of program
- 2 Step 2 : New parameter setting where used.
- 3 Step 3 : New parameter setting where used. After finishing the step 3, the program ends.

Appendix B

Menu Structure & Input Fields

* = Menu Point □ = Input Field ◇ = Decision Input ⊙ = Display only

	Pt		To pt
*	1	Main Menu Temp & Options	
□	1.1	Set Temperature	1.2
□	1.2	Set Vacuum	1.3
□	1.3	Hysteresis Vacuum	1.4
◇	1.4	Start? Now Options	6 1.5
□	1.5	Gradient	1.6
□	1.6	Hold Time	1.7
□	1.7	Start Date	1.8
□	1.8	Start Time	5 or 6

	Pt		To pt
*	2	Main Menu Program	
*	2.1	Program Start	2.2.1
□	2.1.1	Select Program	2.1.2
◇	2.1.2	Start Program? Now Later	6 2.1.3
□	2.1.3	Start Date	2.1.4
□	2.1.4	Start Time	8
*	2.2	Program New	2.2.1
□	2.2.1	Select Program/Step	2.2.2
□	2.2.2	Set Temperature	2.2.3
□	2.2.3	Set Vacuum	2.2.4
□	2.2.4	Hysteresis Vacuum	2.2.5
□	2.2.5	Gradient	2.2.6
□	2.2.6	Holding Time	2.2.7
◇	2.2.7	New Step? Yes No	2.2.2 2.2
◇	2.2.8	End of Program Yes No	2.2 2.2.9
⊙	2.2.9	Program stored..	2.2
*	2.3	Program Edit	2.3.1
□	2.3.1	Program Nr / Step	2.3.2
□	2.3.2	Set Temperature	2.3.3
□	2.3.3	Set Vacuum	2.3.4
□	2.3.4	Hysteresis Vacuum	2.3.5
□	2.3.5	Gradient	2.3.6
□	2.3.6	Hold Time	2.3.7
◇	2.3.7	New Step? No Yes	2.3.8 2.3.1
◇	2.3.8	End of Program No Yes	2.3.6 2.3.9
⊙	2.3.9	Program stored..	2.3
*	2.4	Program Delete	2.4.1
□	2.4.1	Select Program	2.4.2
◇	2.4.2	Delete Program Yes No	2.4.3 2.4.1
⊙		Program Deleted	2.4
*	2.5	Program Print	2.5.1
□	2.5.1	Select Program	2.5.2
⊙	2.5.2	Printing Program	2.5

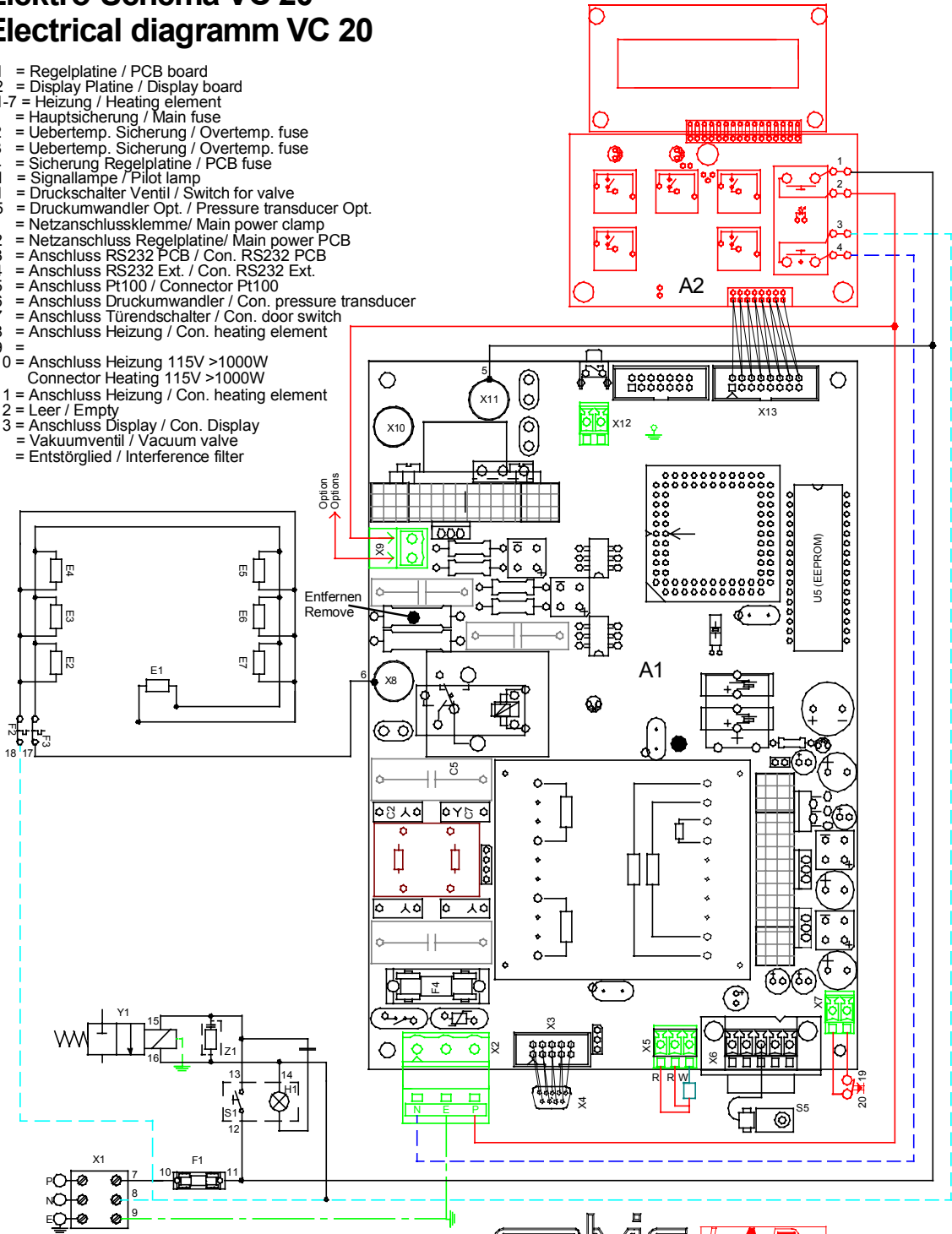
	Pt		To pt
*	3	Main Menu Configuration	
□	3.1	Language	3.2
□	3.2	Date	3.3
□	3.3	Time	3.4
□	3.4	Max. Temp	3.5
□	3.5	Print Interval	3.6
□	3.6	Disp Interval	3.7
□	3.7	Rs232 Baud Rate	3.8
□	3.8	Buzzer Prog End	3.9
□	3.9	Buzzer Safety	3.10
□	3.10	Display Contrast	3.11
□	3.11	Sensor Offset	3.12
□	3.12	Vacuum Offset	3.13
⊙	3.13	Configuration stored	3

Appendix C

Wiring diagram VC 20

Elektro-Schema VC 20 Electrical diagramm VC 20

- A1 = Regelplatine / PCB board
- A2 = Display Platine / Display board
- E1-7 = Heizung / Heating element
- F1 = Hauptsicherung / Main fuse
- F2 = Uebertemp. Sicherung / Overtemp. fuse
- F3 = Uebertemp. Sicherung / Overtemp. fuse
- F4 = Sicherung Regelplatine / PCB fuse
- H1 = Signallampe / Pilot lamp
- S1 = Druckschalter Ventil / Switch for valve
- S5 = Druckumwandler Opt. / Pressure transducer Opt.
- X1 = Netzanschlussklemme/ Main power clamp
- X2 = Netzanschluss Regelplatine/ Main power PCB
- X3 = Anschluss RS232 PCB / Con. RS232 PCB
- X4 = Anschluss RS232 Ext. / Con. RS232 Ext.
- X5 = Anschluss Pt100 / Connector Pt100
- X6 = Anschluss Druckumwandler / Con. pressure transducer
- X7 = Anschluss Türendurchschalter / Con. door switch
- X8 = Anschluss Heizung / Con. heating element
- X9 =
- X10 = Anschluss Heizung 115V >1000W
Connector Heating 115V >1000W
- X11 = Anschluss Heizung / Con. heating element
- X12 = Leer / Empty
- X13 = Anschluss Display / Con. Display
- Y1 = Vakuumventil / Vacuum valve
- Z1 = Entstörglied / Interference filter



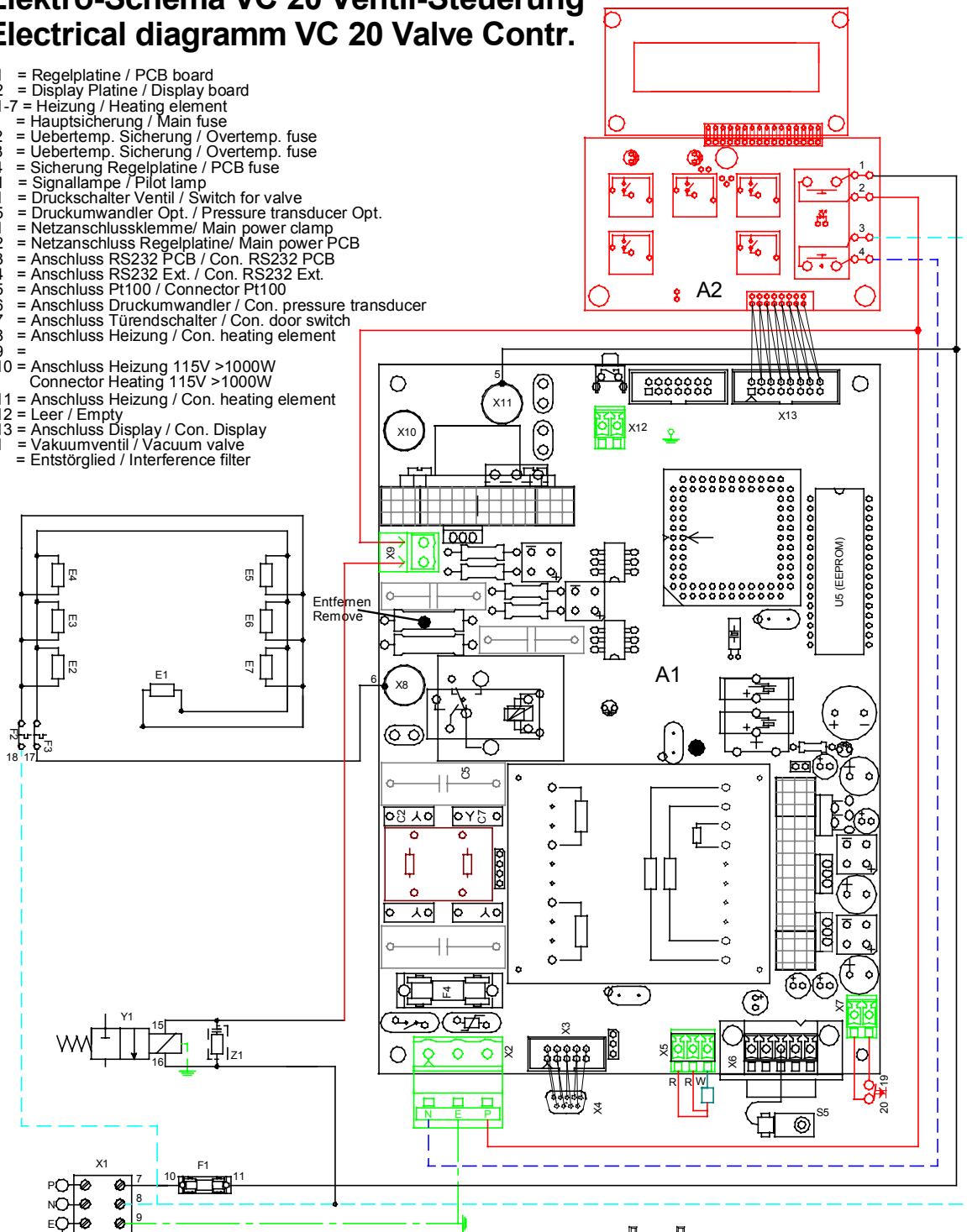
salvis LAB
MADE BY RENGLI

Appendix D

Wiring diagram VC 20 with Valve Control

Elektro-Schema VC 20 Ventil-Steuerung Electrical diagramm VC 20 Valve Contr.

- A1 = Regelplatine / PCB board
- A2 = Display Platine / Display board
- E1-7 = Heizung / Heating element
- F1 = Hauptsicherung / Main fuse
- F2 = Uebertemp. Sicherung / Overtemp. fuse
- F3 = Uebertemp. Sicherung / Overtemp. fuse
- F4 = Sicherung Regelplatine / PCB fuse
- H1 = Signallampe / Pilot lamp
- S1 = Druckschalter Ventil / Switch for valve
- S5 = Druckumwandler Opt. / Pressure transducer Opt.
- X1 = Netzanschlussklemme/ Main power clamp
- X2 = Netzanschluss Regelplatine/ Main power PCB
- X3 = Anschluss RS232 PCB / Con. RS232 PCB
- X4 = Anschluss RS232 Ext. / Con. RS232 Ext.
- X5 = Anschluss Pt100 / Connector Pt100
- X6 = Anschluss Druckumwandler / Con. pressure transducer
- X7 = Anschluss Türendochter / Con. door switch
- X8 = Anschluss Heizung / Con. heating element
- X9 =
- X10 = Anschluss Heizung 115V >1000W
Connector Heating 115V >1000W
- X11 = Anschluss Heizung / Con. heating element
- X12 = Leer / Empty
- X13 = Anschluss Display / Con. Display
- Y1 = Vakuumventil / Vacuum valve
- Z1 = Entstörglied / Interference filter



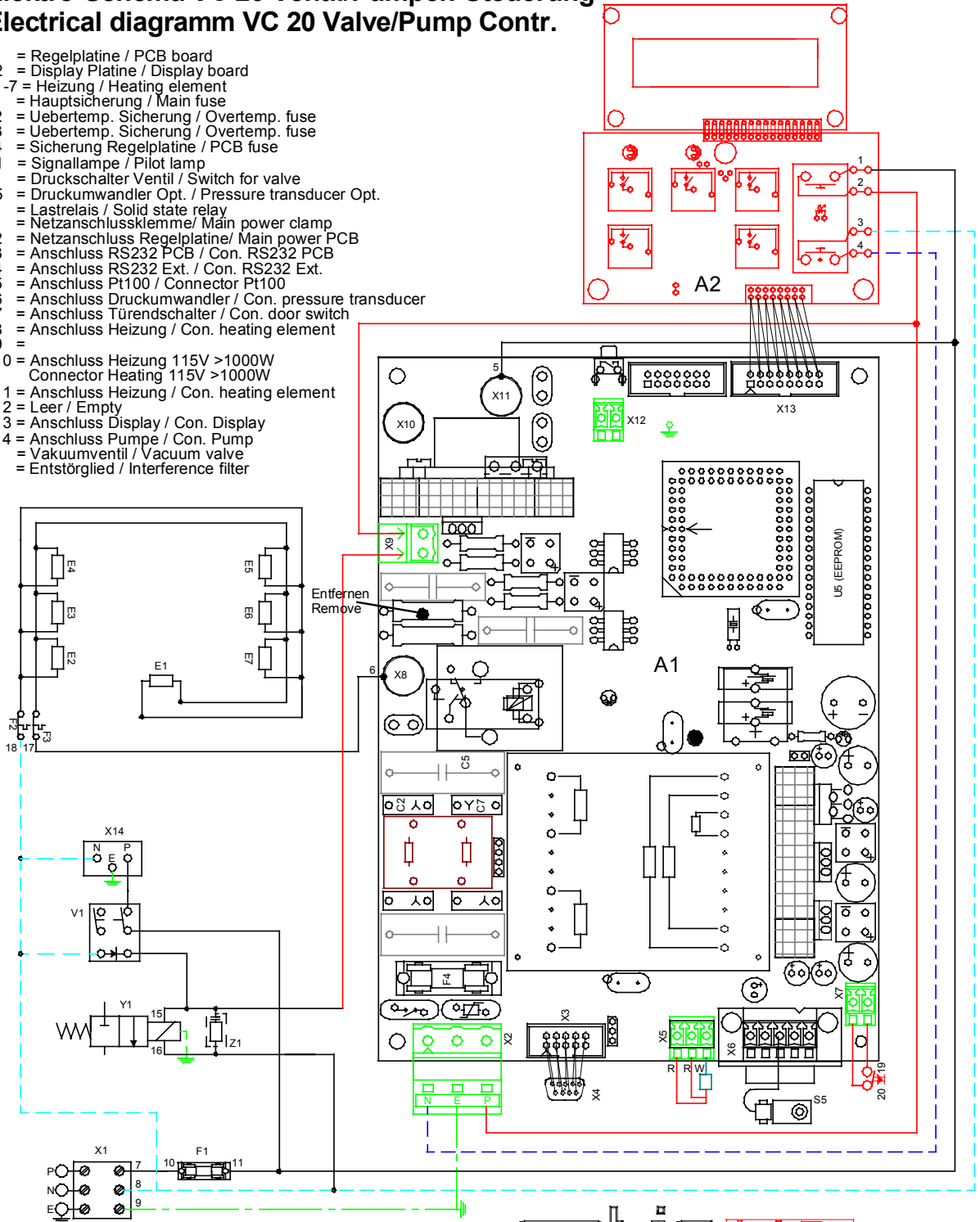
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Appendix E

Wiring diagram VC 20 with Valve- / Pump Control

Elektro-Schema VC 20 Ventil/Pumpen-Steuerung Electrical diagramm VC 20 Valve/Pump Contr.

- A1 = Regelplatine / PCB board
- A2 = Display Platine / Display board
- E1-7 = Heizung / Heating element
- F1 = Hauptsicherung / Main fuse
- F2 = Uebertemp. Sicherung / Overtemp. fuse
- F3 = Uebertemp. Sicherung / Overtemp. fuse
- F4 = Sicherung Regelplatine / PCB fuse
- H1 = Signallampe / Pilot lamp
- S1 = Druckschalter Ventil / Switch for valve
- S5 = Druckumwandler Opt. / Pressure transducer Opt.
- V1 = Lastrelais / Solid state relay
- X1 = Netzanschlussklemme/ Main power clamp
- X2 = Netzanschluss Regelplatine/ Main power PCB
- X3 = Anschluss RS232 PCB / Con. RS232 PCB
- X4 = Anschluss RS232 Ext. / Con. RS232 Ext.
- X5 = Anschluss Pt100 / Connector Pt100
- X6 = Anschluss Druckumwandler / Con. pressure transducer
- X7 = Anschluss Türendschalter / Con. door switch
- X8 = Anschluss Heizung / Con. heating element
- X9 =
- X10 = Anschluss Heizung 115V >1000W
Connector Heating 115V >1000W
- X11 = Anschluss Heizung / Con. heating element
- X12 = Leer / Empty
- X13 = Anschluss Display / Con. Display
- X14 = Anschluss Pumpe / Con. Pump
- Y1 = Vakuumventil / Vacuum valve
- Z1 = Entstörglied / Interference filter



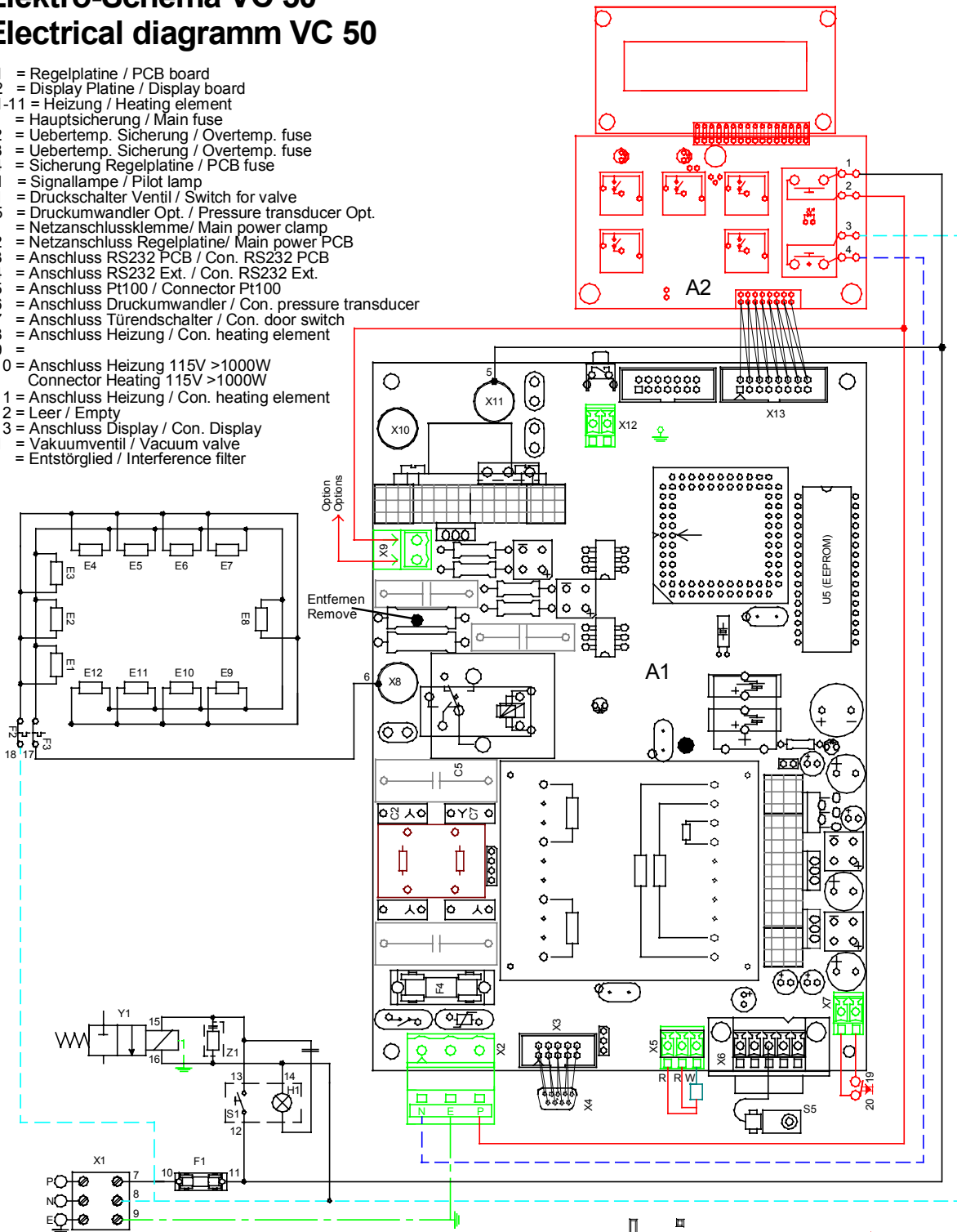
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Appendix F

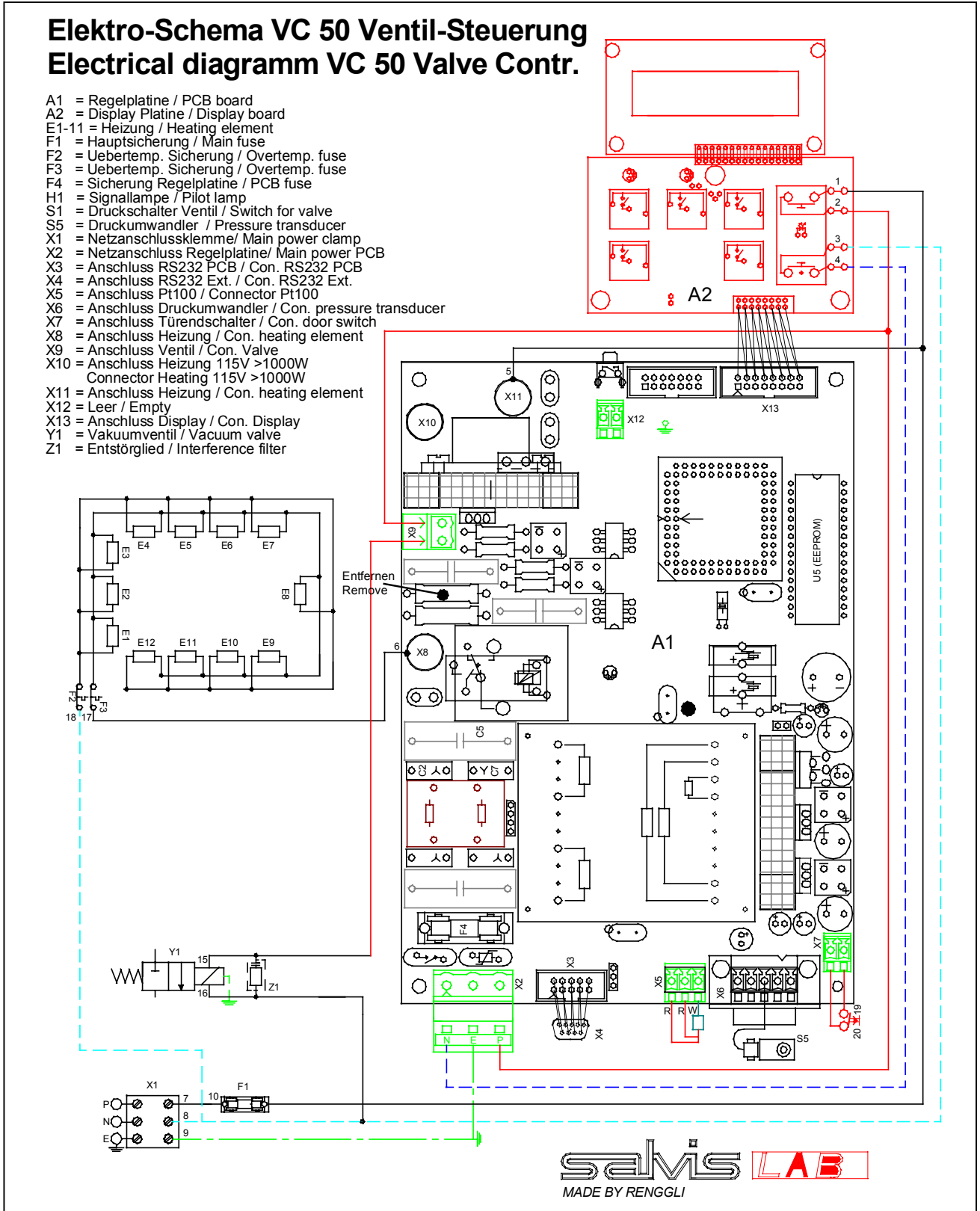
Wiring diagram VC 50

Elektro-Schema VC 50 Electrical diagramm VC 50

- A1 = Regelplatine / PCB board
- A2 = Display Platine / Display board
- E1-11 = Heizung / Heating element
- F1 = Hauptsicherung / Main fuse
- F2 = Uebertemp. Sicherung / Overtemp. fuse
- F3 = Uebertemp. Sicherung / Overtemp. fuse
- F4 = Sicherung Regelplatine / PCB fuse
- H1 = Signallampe / Pilot lamp
- S1 = Druckschalter Ventil / Switch for valve
- S5 = Druckumwandler Opt. / Pressure transducer Opt.
- X1 = Netzanschlussklemme/ Main power clamp
- X2 = Netzanschluss Regelplatine/ Main power PCB
- X3 = Anschluss RS232 PCB / Con. RS232 PCB
- X4 = Anschluss RS232 Ext. / Con. RS232 Ext.
- X5 = Anschluss Pt100 / Connector Pt100
- X6 = Anschluss Druckumwandler / Con. pressure transducer
- X7 = Anschluss Türenschafter / Con. door switch
- X8 = Anschluss Heizung / Con. heating element
- X9 =
- X10 = Anschluss Heizung 115V >1000W
Connector Heating 115V >1000W
- X11 = Anschluss Heizung / Con. heating element
- X12 = Leer / Empty
- X13 = Anschluss Display / Con. Display
- Y1 = Vakuumventil / Vacuum valve
- Z1 = Entstörglied / Interference filter



Wiring diagram VC 50 with Valve Control

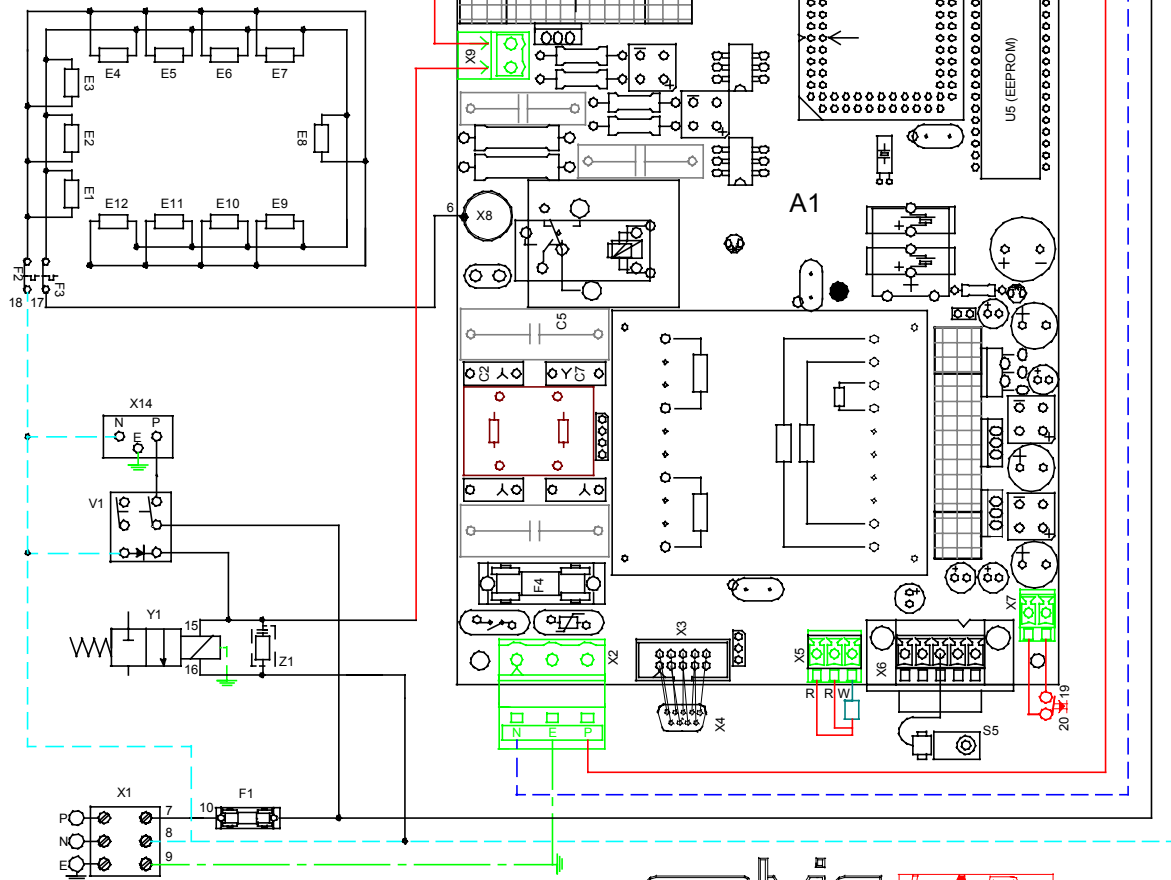


Appendix H

Wiring diagram VC 50 with Valve- / Pump Control

Elektro-Schema VC50 Ventil/Pumpen-Steuerung Electrical diagramm VC50 Valve/Pump Contr.

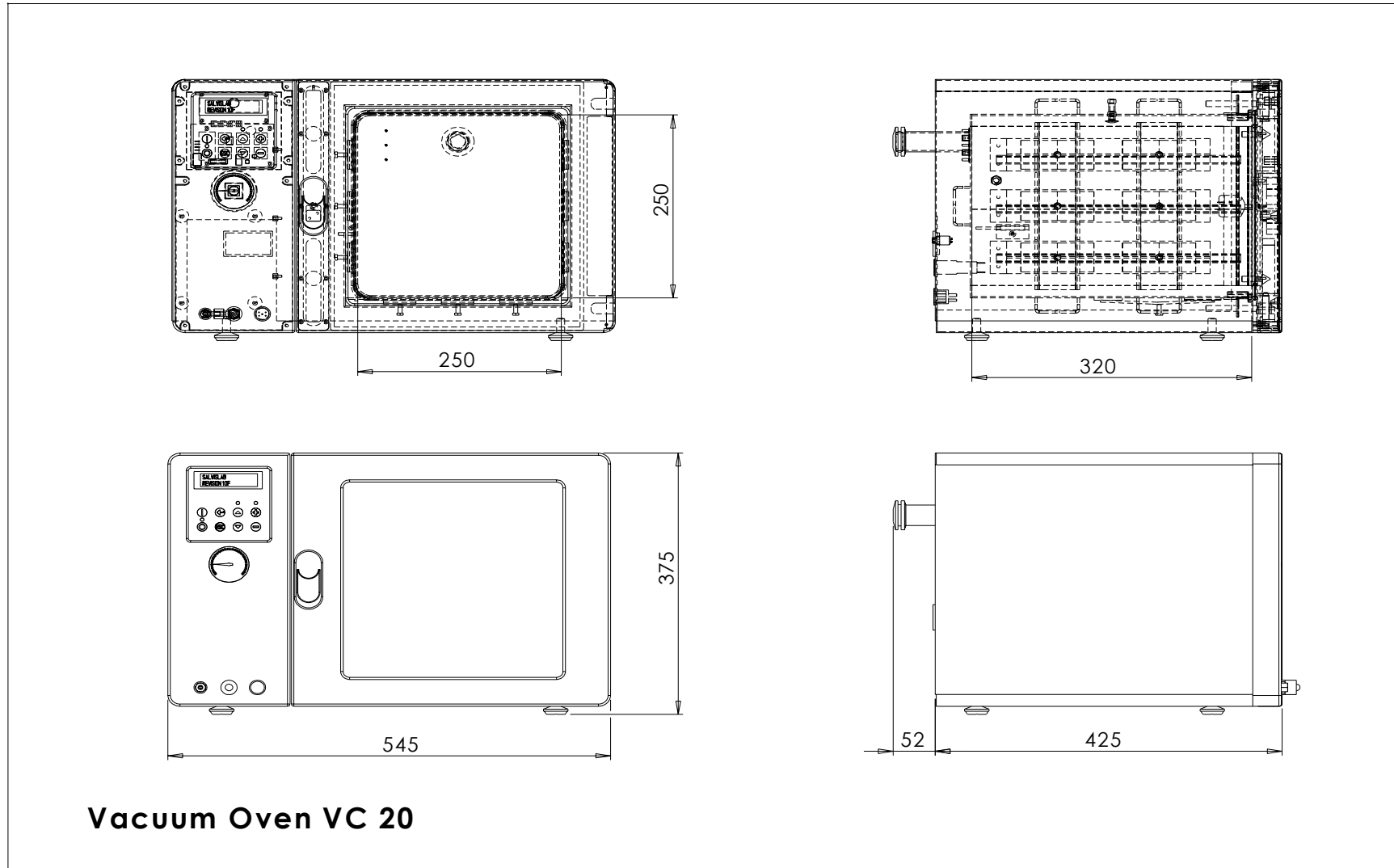
- A1 = Regelplatine / PCB board
- A2 = Display Platine / Display board
- E1-11 = Heizung / Heating element
- F1 = Hauptsicherung / Main fuse
- F2 = Uebertemp. Sicherung / Overtemp. fuse
- F3 = Uebertemp. Sicherung / Overtemp. fuse
- F4 = Sicherung Regelplatine / PCB fuse
- H1 = Signallampe / Pilot lamp
- S1 = Druckschalter Ventil / Switch for valve
- S5 = Druckumwandler / Pressure transducer
- V1 = Lastrelais / Solid state relay
- X1 = Netzanschlussklemme/ Main power clamp
- X2 = Netzanschluss Regelplatine/ Main power PCB
- X3 = Anschluss RS232 PCB / Con. RS232 PCB
- X4 = Anschluss RS232 Ext. / Con. RS232 Ext.
- X5 = Anschluss Pt100 / Connector Pt100
- X6 = Anschluss Druckumwandler / Con. pressure transducer
- X7 = Anschluss Turendschalter / Con. door switch
- X8 = Anschluss Heizung / Con. heating element
- X9 = Anschluss Ventil / Con. Valve
- X10 = Anschluss Heizung 115V >1000W
Connector Heating 115V >1000W
- X11 = Anschluss Heizung / Con. heating element
- X12 = Leer / Empty
- X13 = Anschluss Display / Con. Display
- X14 = Anschluss Pumpe / Con. Pump
- Y1 = Vakuumventil / Vacuum valve
- Z1 = Entstörglied / Interference filter



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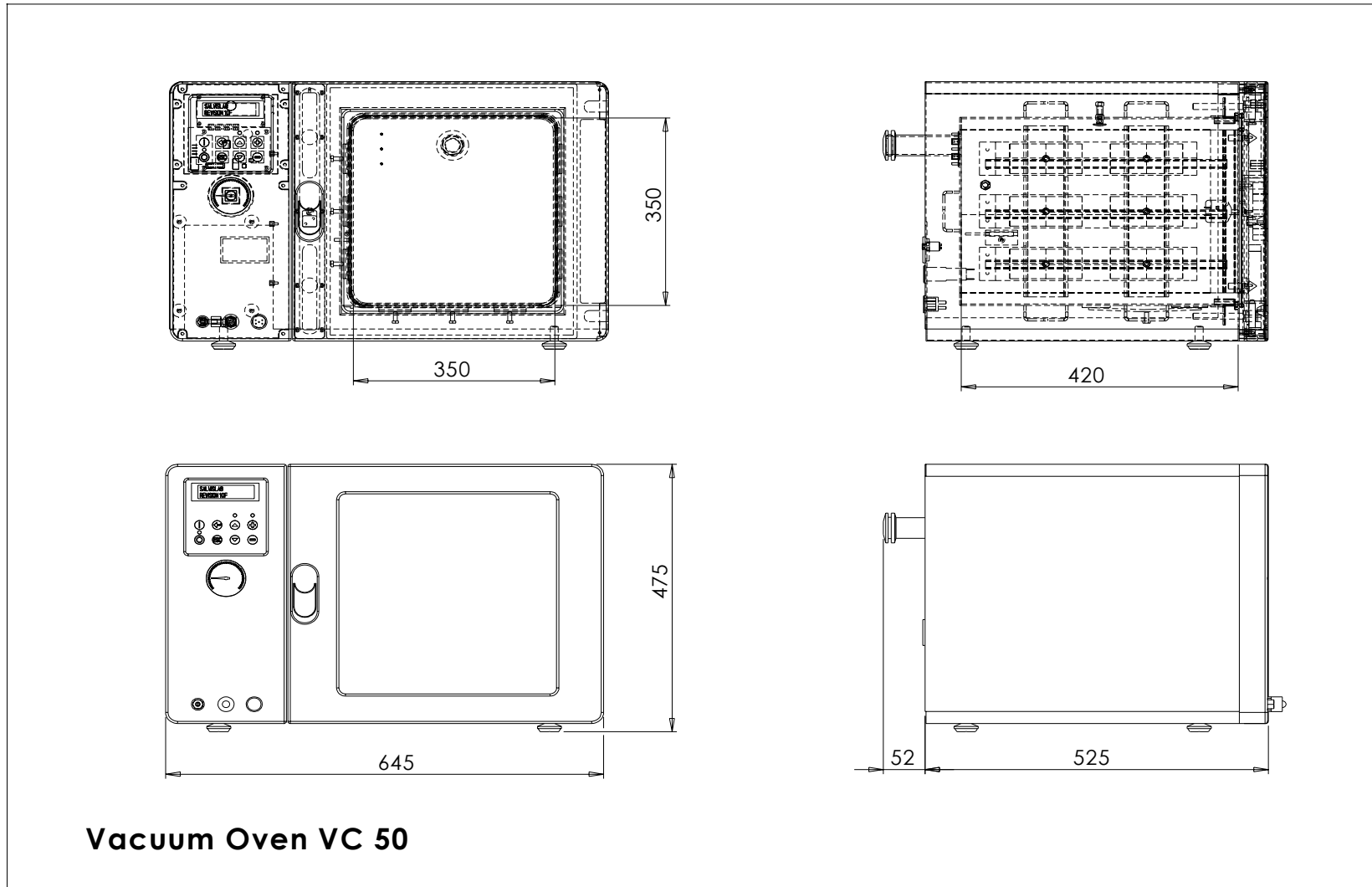
Appendix I

Drawing VC 20

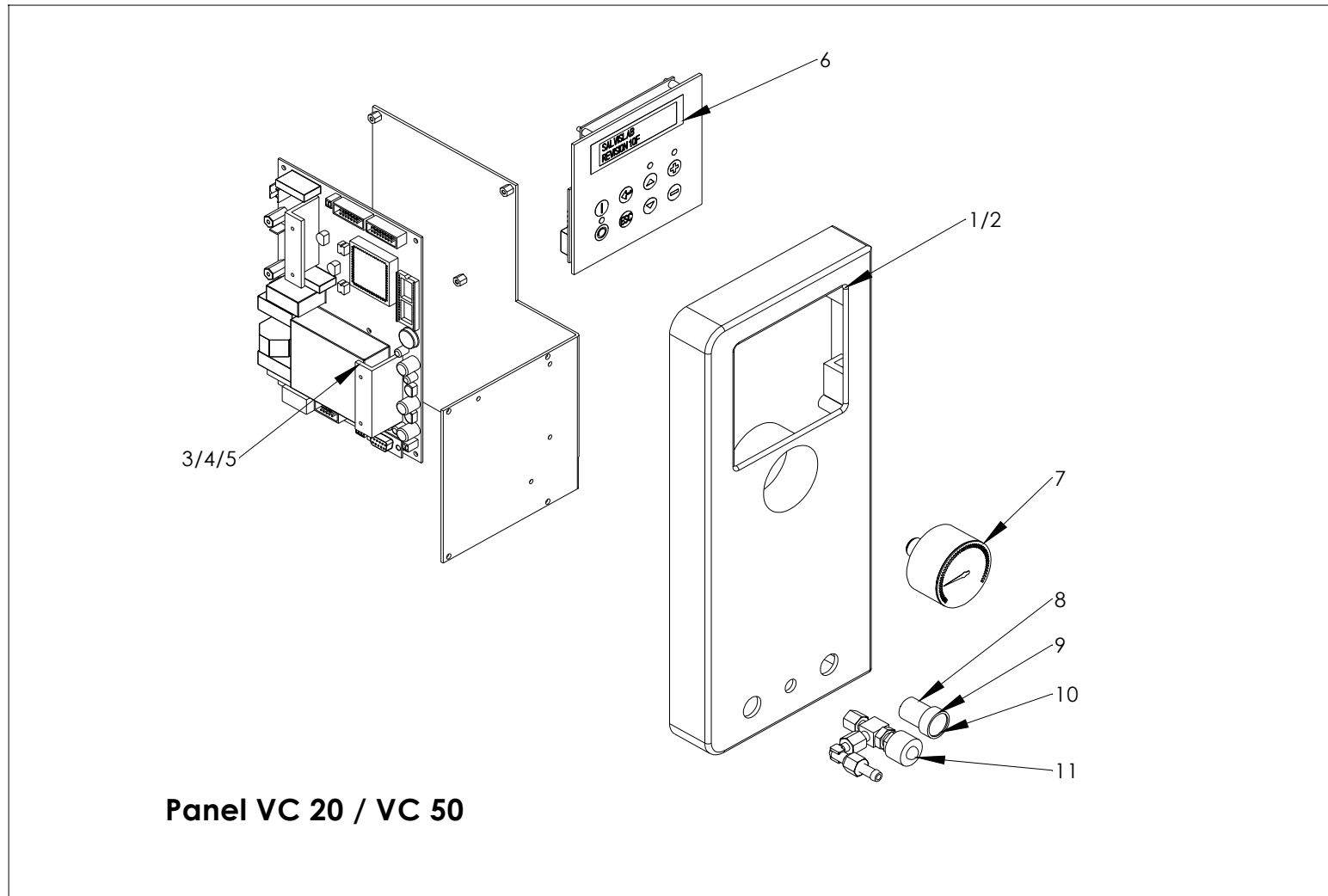


Appendix J

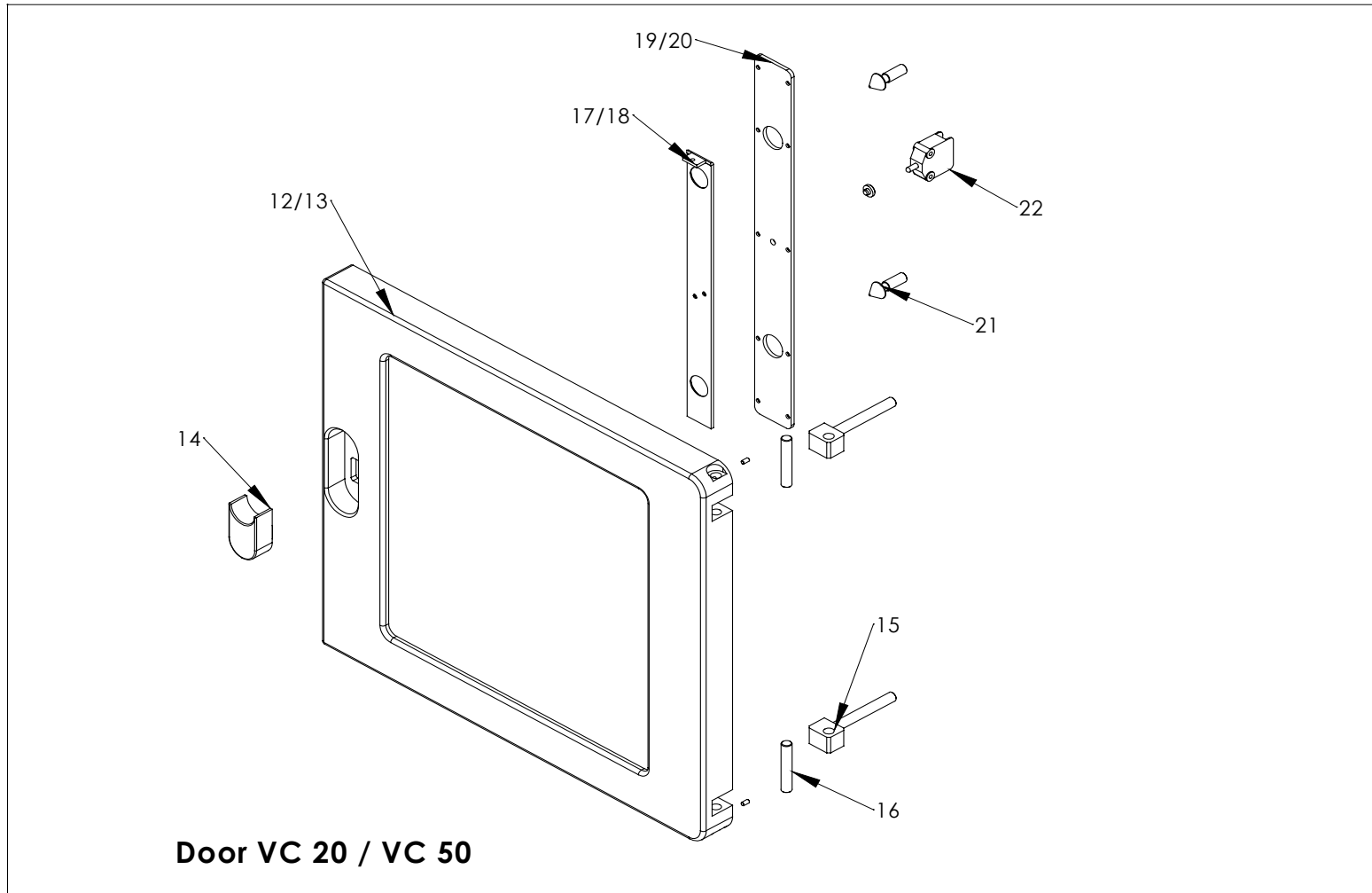
Drawing VC 50



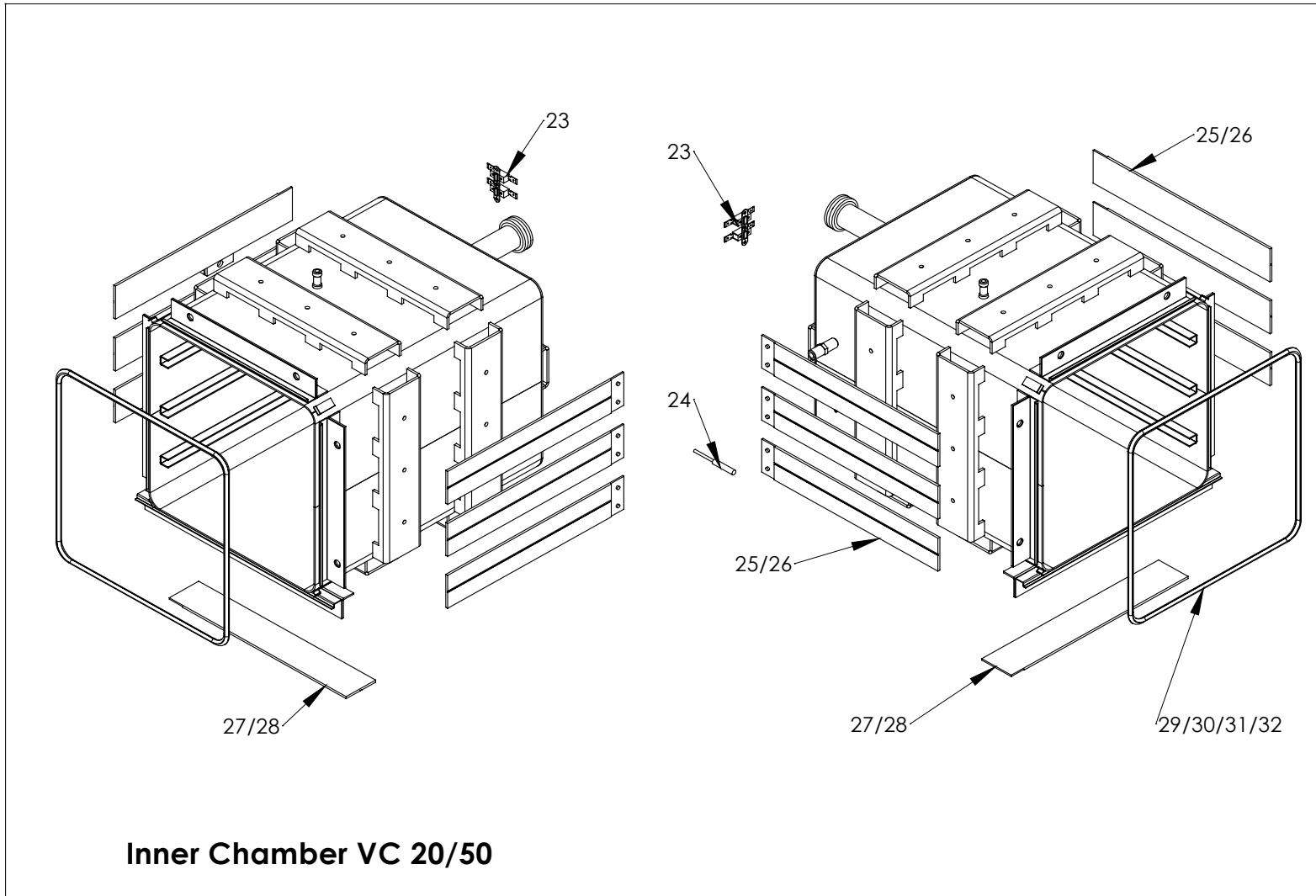
Drawing Spare Parts Panel



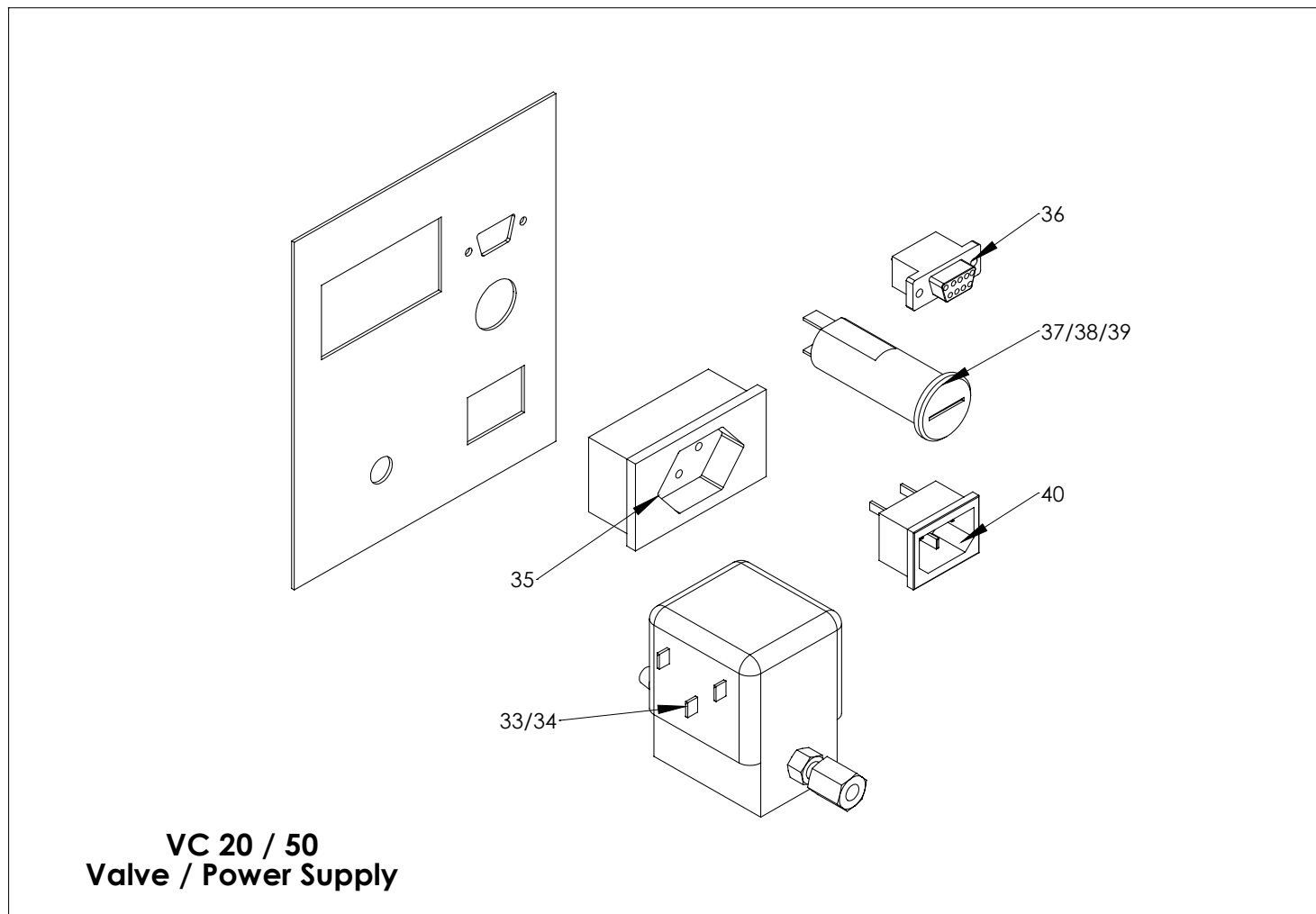
Drawing Spare Parts Door



Drawing Spare Parts Chamber



Drawing Spare Parts Valve / Power Supply



Appendix O

Spare Part Numbers

Position	Part Number	Description
1	31W04172015	Panel for VC-50
2	31W04172014	Panel for VC-20
3	31W04144150	Main PCB VC-20/50 230V/10A
4	31W04144151	Main PCB VC-20 115V/10A
5	31W04144149	Main PCB VC-50 115V/20A
6	31W04144152	Touch Panel 115V/230V
7	31W04942315	Gauge
8	31W04960707	Vacuum switch
9	31W04960708	Lid (green) for vacuum switch
10	31W04962007	Bulb for vacuum switch
11	31W04942309	Inlet valve for air / Inert gas
12	31W04172006	Door VC 20
13	31W04171006	Door VC 50
14	31W04174019	Door handle VC 20 / 50
15	31W04174095	Hinge bolt VC 20 / 50
16	31W04174200	Pin to hinge
17	31W04173010	Locking plate VC 20
18	31W04173011	Locking plate VC 50
19	31W04173009	Cover plate VC 20
20	31W04172002	Cover plate VC 50
21	31W04174096	Locking pin
22	31W04960700	Door switch
23	31W04962507	Over temperature fuse
24	31W04144123	Temperature sensor PT100
25	31W04870018	Flat heating element 230V / 110 Watt for VC-20/50
26	31W04962923	Flat heating element 115V / 110 Watt for VC-20/50
27	31W04870019	Flat heating element 230V / 133 Watt for VC-50
28	31W04962924	Flat heating element 115V / 133 Watt for VC-50

Spare Part Numbers

Position	Part Number	Description
29	31W04943208	Door seal white VC 20 (starting with SN 317061)
30	31W04943209	Door seal white VC 50 (starting with SN 317061)
31	31W04174090	Door seal black VC 20 (until SN 317060)
32	31W04174091	Door seal black VC 50 (until SN 317060)
33	31W04848069	Single solenoid valve 230V/50Hz
34	31W04942340	Single solenoid valve 115V/60Hz
35	31W04884001	Power Plug for Vacuum Pump
36	31W04961478	D-Sub 9 Connector
37	31W04881007	Fuse Holder
38	31W04881008	Closing Cap to Fuse Holder
39	31W04881010	Fuse 10 A
40	31W04961469	Appliance Couper